The Final Environmental Impact Statement (EIS) consists of the Draft EIS and a separately bound addendum. This addendum contains responses to comments on the Draft EIS and changes made in the EIS because of those comments.

Carnation Wastewater Treatment Facility

FINAL
ENVIRONMENTAL IMPACT STATEMENT

October 2004

King County
Department of
Natural Resources and Parks
Wastewater Treatment Division

King County
Wastewater Treatment Division
Department of Natural Resources and Parks
King Street Center
201 South Jackson Street
Seattle, WA 98104-3855

October 15, 2004

Dear Community Members,

The King County Wastewater Treatment Division is pleased to present the Final Environmental Impact Statement (EIS) for the Carnation Wastewater Treatment Facility. The City of Carnation has determined that replacing on-site septic systems with a wastewater treatment facility is important to address public health concerns, achieve the city's comprehensive plan goals and maintain and enhance community livability. The City has contracted with King County to design, build, operate and maintain the treatment facility, which will include a treatment plant, conveyance pipe and a discharge option. The new wastewater treatment facility will serve the city and its urban growth area, as defined in the city's comprehensive plan.

King County is committed to protecting public health and the environment. King County has provided safe, environmentally sound wastewater treatment in the central Puget Sound region for 40 years.

The Draft EIS on the Carnation Wastewater Treatment Facility was issued on June 28, 2004. The Draft EIS analyzed in detail the characteristics, probable significant impacts, and mitigation measures for the Carnation Wastewater Treatment Facility alternatives. Issuance of the Draft EIS was followed by a thirty-day public comment period that included a public hearing. Eight government agencies and 20 individuals or groups provided comments. King County considered all of the comments submitted in preparing the Final EIS.

The Final EIS describes the Carnation Wastewater Treatment Facility proposal; identifies potential environmental impacts of the alternatives; and identifies reasonable mitigation measures to reduce and, in some cases, eliminate the identified impacts. The Final EIS also includes King County's responses to comments, including changes made in the EIS as a result of those comments.

Because King County will be required to ensure that the facility meets all applicable regulatory requirements, the King County Executive, in consultation with the City of Carnation, will make a final decision in fall 2004 on the treatment plant site, conveyance route and discharge option. His decision will be based on the analyses in the Draft and Final EISs, as well as other factors—including cost, community considerations, engineering, and policy issues. King County and the Carnation City Council worked together on establishing a decision process. More information on that process can be found on the King County Web site at http://dnr.metrokc.gov/wtd/carnation/. The King County Executive will carefully consider comments from the City of Carnation and community members in making the decision.

We are committed to being a good neighbor and an asset to the area. We have worked closely with the City of Carnation and local residents and groups to minimize the impacts and maximize benefits of this project. We will continue to do so. Your involvement plays an important role in the decision and design processes. Please take time to read the Final EIS and stay involved with this project.

Sincerely,

Don Theiler,
SEPA Responsible Official and Division Director
Wastewater Treatment Division

Final Environmental Impact Statement

for the

Carnation Wastewater Treatment Facility

October 2004

Prepared in compliance with the State Environmental Policy Act (SEPA) (RCW 43.21C), the SEPA Rules (WAC 197-11), and Chapter 20.44 King County Code, implementing SEPA in King County procedures.

This information is available in accessible formats upon request at 206-684-1280 (voice) or 711 (TTY).

King County

Department of Natural Resources and Parks

Wastewater Treatment Division

King Street Center, KSC-NR-0505

201 South Jackson Street

Seattle, WA 98104

Fact Sheet

Name of Proposal

Carnation Wastewater Treatment Facility

Description of Proposal

At the request of the City of Carnation, King County proposes to build and operate a new wastewater treatment facility. The facility would serve the City of Carnation and its urban growth area. The facility would include a treatment plant, conveyance pipes and a discharge. The treatment plant would use advanced wastewater treatment to produce highly treated water. The facility would have an initial capacity of about 400,000 gallons of wastewater per day. Its capacity could be expanded to treat up to 450,000 gallons per day. The City of Carnation would construct and maintain a sewer system to collect and convey wastewater to the new treatment plant as a separate project.

Two alternative treatment plant sites, three alternative discharge sites and six alternative conveyance routes are evaluated in this EIS.

Location of Proposal

The three elements of the facility would be located in or near the City of Carnation, Washington. The two alternative treatment plant sites would be within the city limits at the west end of Entwistle Street and immediately east of the fire station. The river discharge alternative would be located northeast of the city at the location where the Carnation Farm Road crosses the Snoqualmie River. The wetland discharge alternative would be located about two miles north of the city in the Stillwater Wildlife Area. The upland discharge alternative would be located southeast of the city near the old City of Carnation landfill. Conveyance routes would mainly follow city streets, county roads and the Snoqualmie Valley Trail between the treatment plant and discharge locations.

Proponent/Lead Agency

King County Department of Natural Resources and Parks
Wastewater Treatment Division
201 South Jackson Street
Seattle, WA 98104

Responsible Official

Donald Theiler, Division Director, Wastewater Treatment Division, King County Department of Natural Resources and Parks

SEPA Contact Person

Shirley Marroquin, Supervisor, Environmental Planning and Community Relations, Wastewater Treatment Division, King County Department of Natural Resources and Parks, 206-684-1173

Preparers and Contributors

King County Wastewater Treatment Division
Adolfson Associates
Carollo Engineers
Robinson, Noble and Saltbush, Inc.
City of Carnation
Roth Hill Engineering

Permits

The following permits and approvals may be needed for this project.

Federal

U.S. Army Corps of Engineers Section 404 Permit
Endangered Species Act Section 7 Consultation with the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration (NOAA) Fisheries

State

Washington Department of Ecology 401 Water Quality Certification
Washington Department of Ecology National Pollutant Discharge Elimination System Permit for Construction
Washington Department of Fish and Wildlife Hydraulic Project Approval
Washington Department of Natural Resources Aquatic Lands Lease

Local

King County Shoreline Substantial Development Permit
King County Public Agency Utility Exception
King County Clearing and Grading Permit
King County Right of Way Construction Permit
King County Right of Way Use Permit
King County Special Use Permit

King County Building Permit
City of Carnation Building Permit
City of Carnation Shoreline Substantial Development Permit
City of Carnation Grading Permit

Final EIS Issued

October 15, 2004

Draft EIS Issued

June 28, 2004

End of Draft EIS Comment Period

July 27, 2004

Public Hearing

A public hearing to receive comments on the Draft EIS was held on July 14, 2004 at the Tolt Middle School in Carnation, Washington.

Final EIS Format and Circulation

Pursuant to WAC 197-11-560(5), this Final EIS has been prepared in the form of an addendum. The Final EIS consists of the Draft EIS (bound separately) and the addendum. The addendum consists of this updated fact sheet, responses to comments received on the Draft EIS and changes to the EIS. Copies of the addendum are being sent to recipients of the Draft EIS and those who commented on the Draft EIS.

Filing an Administrative Appeal of the Carnation Final EIS:

Anyone wishing to appeal the adequacy of the Carnation Final Environmental Impact Statement must file a Notice of Appeal and the appeal fee with the SEPA Responsible Official. The Notice of Appeal must be **received** at the address below **no later than 5:00 PM** on **November 1, 2004**:

Wastewater Treatment Division SEPA Responsible Official
ATTN: Division Director's Office
201 South Jackson, KSC-NR-0501
Seattle, WA 98104-3855

Pursuant to KCC 20.24.450, the Notice of Appeal must be accompanied by the appeal fee of $250.00. Payment must be by check or money order made payable to "King County Treasury."

For a copy of the public rule on King County's SEPA administrative appeal process, please see the King County Web site at http://www.metrokc.gov/recelec/archives/policies/put74pr.htm, or contact the Carnation Project Team at (206) 263-5212 or toll free at 1-800-325-6165 or at this e-mail address: CarnationWWTP@metrokc.gov. For accessible formats call 206-684-1280 or 711 (TTY).

Planned Action by King County

In cooperation with the City of Carnation, the King County Executive plans to make a final decision on the locations of one wastewater treatment plant site, one conveyance corridor and one highly treated water discharge site following issuance of this Final EIS.

Subsequent Environmental Review

Pursuant to WAC 197-11-600, this EIS is intended to serve as the basis for all local and state permits and approvals required to construct the Carnation Wastewater Treatment Facility. It is also intended to serve as the principal resource document relied upon by any federal agencies with regulatory or funding authority.

Documents Incorporated by Reference

The documents listed below are incorporated by reference into this EIS. The City of Carnation Comprehensive Plan was prepared pursuant to the Washington State Growth Management Act and is the principal planning document for the orderly development of the city. The Comprehensive Sewer Plan is the City's primary planning document for the development of a sanitary sewer system in the City. A SEPA determination of nonsignificance (DNS) for each of these plans is also listed. A DNS is a determination that the proposed action does not have a probable significant adverse impact on the environment, based on the review of an environmental checklist and any other relevant information.

Carnation, City of. 1997. *City of Carnation 1996 Comprehensive Plan.* Carnation, WA: City of Carnation.

Carnation, City of. 2004. *2004 Comprehensive Sewer Plan.* Carnation, WA: City of Carnation.

Carnation, City of. 2003. *State Environmental Policy Act Determination of Nonsignificance, City of Carnation Land Use Plan Amendment*. September 29, 2003.

Carnation, City of. 2003. *State Environmental Policy Act Determination of Nonsignificance, City of Carnation 2003 Comprehensive Sewer Plan*

King County Council. *An Ordinance amending the Comprehensive Water Pollution Abatement Plan, a King County Functional Plan*. Ordinance 14492. October 11, 2002.

King County Council. *An Ordinance authorizing the executive to enter into an agreement with the city of Carnation for disposal of sewage.* Ordinance 14582. March 13, 2003.

Location of Incorporated Documents

All documents incorporated by reference are available for review at the King County Department of Natural Resources and Parks, Wastewater Treatment Division; Carnation City Hall; and the libraries listed below.

Availability of Final EIS

Hard copies of the Carnation Wastewater Treatment Facility Final EIS Addendum are being distributed to affected jurisdictions and agencies as well as groups and members of the public who commented on the Draft EIS. Additional copies of the Carnation Wastewater Treatment Facility Final EIS (Draft EIS plus addendum) are available in several forms and at several locations:

- The Final EIS can be viewed on the Internet at http://dnr.metrokc.gov/wtd/carnation/

- CDs (including both the addendum and Draft EIS) can be obtained from King County free of charge (see below).

- Hard copies of the addendum can be obtained from King County free of charge. Hard copies of the Draft EIS can also be obtained free of charge while supplies last. See below for details.

CDs and hard copies can be picked up at the King County Wastewater Treatment Division, 5th floor reception desk, 201 South Jackson Street, Seattle; at Carnation City Hall or, to request copies by mail, call the Carnation Wastewater Treatment Facility Project Team at 206-263-5212 or toll-free 1-800-325-6165 ext. 35212. Copies may also

be requested by e-mail to CarnationWWTP@metrokc.gov. For accessible formats call 206-684-1280 or 711 (TTY).

Copies of the Final EIS are also available for review at Carnation City Hall and the following libraries:

- Carnation Public Library, 4804 Tolt Avenue, Carnation
- Duvall Public Library, 15619 N.E. Main Street, Duvall
- Fall City Public Library, 33415 S.E. 42nd Place, Fall City
- Bellevue Public Library, 1111 110th Avenue NE, Bellevue

Contents

Responses to Comments on the Draft EIS

RECEIVED
AUG 2 2004
ENVIRONMENTAL PLANNING DIVISION

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

July 29, 2004

Mr. Wesley Sprague
Senior Environmental Planner
King County Wastewater Treatment Division
201 S. Jackson St., MS KSC-NR-0505
Seattle, WA 98104-3855

RE: Carnation Wastewater Treatment Facility Draft Environmental Impact Statement

Dear Mr. Sprague:

The Water Quality Section of the Northwest Regional Office thanks you for the opportunity to comment on the Draft Environmental Impact Statement for the proposed Carnation Wastewater Treatment Facility. We commend King County and Carnation's efforts to protect water quality in Carnation and the surrounding Snoqualmie River area.

S1-1 We would like you to be aware that we have not received the final copy of the general sewer plan (2004 Comprehensive Plan) from Carnation. Although we have reviewed a draft copy, the final sewer plan approval is delayed pending King County approval and subsequent Carnation Council approval of the final version. The population, wastewater flow projections, and other design issues contained in that document would need to be consistent with what King county is proposing for capacity at the wastewater treatment facility. WAC 173-240-050 (2) requires that general sewer plans be sufficiently complete so that engineering reports can be developed from it without substantial alterations of concept and basic considerations. Substantial changes made to the sewer plan version we have reviewed could potentially require an amendment to the EIS. We do not anticipate changes, but you need to be aware of the potential risk.

S1-2 WAC 173-240-060 (1) requires that the engineering report for a domestic wastewater facility include each appropriate (as determined by the department) item required in WAC 173-240-050 for general sewer plans unless an up-to-date general sewer plan is on file with the department. Since we have not received or reviewed the wastewater treatment Facilities Plan upon which the EIS is based, there is a risk that review of the Facility Plan would require changes to the Facility Plan. King County needs to be aware that substantial changes to the Facilities Plan could require an amendment to the EIS.

State Agencies

Washington State Department of Ecology (S1)

Response to Comment S1-1

King County does not expect changes in projected wastewater flows or project design that would cause impacts beyond the range of impacts described in the Draft and Final EIS. If there are changes in Carnation's sewer plan that cause changes in the treatment plant design, King County will assess those design changes to determine if additional environmental review of the Carnation wastewater treatment facility is necessary.

Response to Comment S1-2

King County will evaluate any changes to the facility plan to determine whether they involve environmental impacts that are beyond the range of those discussed in the Final EIS. If they are, the County will conduct additional environmental review as appropriate.

Mr. Wesley Sprague
July 29, 2004

We have a limited number of other comments I would like to pass on to you:

S1-3 ▪ Section 3.1.1.1 Page 3-12. Has natural gas or LP gas been considered as a source of fuel for standby power generation? The proximity to the river and the potential for spill and leakage of diesel fuel makes selection of diesel fuel more problematic than natural or LP gas.

S1-4 ▪ Section 3.1.1.1, Page 3-4: The transport of solids to the proposed Brightwater treatment plant for disposal has the potential to provide a lesser cost since it is 10 miles shorter than Renton. The EIS may want to address treatment at either location in the interest of flexibility.

S1-5 ▪ Section 1.9.3, third paragraph; please note that wetland discharges ultimately flowing to the waters of the state require a NPDES permit.

Thank you again for the opportunity to comment. If you have any questions please call me at (425) 649-7164, or e-mail me at KZIE461@ecy.wa.gov.

Sincerely,

Kenneth D. Ziebart, P.E.
Department of Ecology, Northwest Regional Office
Water Quality Program

cc: John Komorita, King County

Response to Comment S1-3

Natural gas and propane engines provide less energy for the size of the unit and the engine block for a natural gas or propane unit will typically be twice the size and cost of a diesel unit providing the equivalent electrical power. For the diesel engine generator unit, King County would propose to have a self-contained steel tank mounted above grade, with the engine generator unit mounted on this tank. This configuration would minimize the possibility of leakage from buried fuel lines and have a lower capital cost than a natural gas or propane unit. Please also see the response to comment O1-14 for a discussion of measures to prevent and contain any fuel leaks or spills.

Response to Comment S1-4

Although King County currently plans to send solids produced by the Carnation Wastewater Treatment Facility to the South Treatment Plant, sending them to the Brightwater treatment plant will also be considered. The Brightwater treatment plant is scheduled to begin operation in 2010. In addition to hauling distance, the types of receiving facilities available for the solids must be taken into account. For example, the South Plant's septage receiving station or Dissolved Air Flotation Tanks could be used. Alternatively, the solids could be delivered to the Brightwater thickening process.

Response to Comment S1-5

The second sentence in the second paragraph of this section states that the wetland discharge alternative would require an NPDES permit.

WASHINGTON STATE DEPARTMENT OF
Natural Resources

DOUG SUTHERLAND
Commissioner of Public Lands

August 20, 2004

Mr. Wesley Sprague
King County Wastewater Treatment Division
201 South Jackson St, Suite 505
Seattle, WA 98104

SUBJECT: Comments on DEIS for the Carnation Wastewater Treatment Facility

Dear Mr. Sprague:

Thank you for giving the Washington State Department of Natural Resources (WADNR) the opportunity to comment on your DEIS for the Carnation Wastewater Treatment Facility. As proprietary manager of state-owned aquatic lands WADNR is charged with four main tasks related to those lands – encouraging public use and access; fostering water-dependent uses; ensuring environmental protection; and utilizing renewable resources (Revised Code of Washington RCW 79.90.455).

S2-1 The WADNR commends you on your effort to propose innovative alternatives and drive to use the highest technologies available. We support the tertiary level of treatment that the new plant is proposing to utilize. The use of membrane bioreactor technology will help eliminate bacteria, viruses, and nutrients from the effluent, which could reside in the sediment and negatively impact the natural water systems, which it is discharged into.

S2-2 In following the tasks that WADNR has been charged with, we are working to ensure environmental protection by trying to reduce our reliance on the state waters as a disposal site for effluent. We support and promote the progress of Wastewater Facilities to implement alternative disposal methods or find ways for water re-use. WADNR preferred alternative is upland disposal, which includes water re-use and land application options. Moreover, wetland discharge is an alternative that WADNR supports. Only when these other options are technically or economically unfeasible do we support discharge into the river.

S2-3 WADNR encourages Wastewater Facilities to pursue efforts to reduce the waste load and volume of effluent. A water conservation and pollution prevention program will help educate the public about water consumption and reduce the amount of wastewater influent.

S2-4 The Snoqualmie River outfall alternative is located on state-owned aquatic lands (SOAL). If the river discharge alternative is chosen, King County will need to apply for an aquatic lands easement with the WADNR. Please contact the WADNR, if this option is chosen, so we can begin the application process.

SOUTH PUGET SOUND REGION ▮ 950 FARMAN AVE N ▮ ENUMCLAW, WA 98022-9282
TEL: (360) 825-1631 ▮ FAX: (360) 825-1672 ▮ TTY: (360) 825-6381
Equal Opportunity/Affirmative Action Employer

RECYCLED PAPER

Washington State Department of Natural Resources (S2)

Response to Comment S2-1

Thank you for your comment.

Response to Comment S2-2

The Draft EIS evaluates and compares the potential environmental impacts of the three discharge alternatives. These impacts will be weighed by decision-makers along with technical, economic and other factors in choosing a discharge alternative.

Response to Comment S2-3

The City of Carnation's plans for water conservation are discussed in Chapter 1, Section 1.9.5 (new section). King County has pollution prevention programs in place that are designed to keep hazardous materials out of the wastewater system. These programs will be extended to Carnation when the treatment facility goes into operation.

Response to Comment S2-4

If the river discharge alternative is chosen, King County will contact and work closely with WADNR to meet all applicable requirements.

S2-5 If the outfall alternative is chosen, it should be constructed and designed to minimize impacts to the river system. First, consider using a strong and durable material for the pipeline, such as HDPE. This material will increase the life expectancy of the outfall. Secondly, consider minimizing or eliminating the use of riprap as a bank stabilizer. The proposed outfall location has a low riverbank; therefore, a more natural alternative for bank stabilization may be feasible. Additionally, the construction of the outfall should minimize any benthic impacts. There are other options to trenching, such as drilling. If this alternative is feasible it could cause the least impact to the river system. Finally, please note that any mitigation or restoration proposed on SOAL must be approved by the WADNR and a use authorization must be granted.

Thank you for considering the Washington State Department of Natural Resources comments.

Sincerely,

Monica Durkin GW

Monica Durkin
Land Manager

Response to Comment S2-5

If the river discharge alternative is chosen, King County will work with WADNR during design to develop an outfall design that meets WADNR's requirements.

King County
Department of Natural Resources and Parks
Water and Land Resources
Agriculture Program

Carnation Wastewater Treatment Facility DEIS
July 26, 2004

King County Agriculture Program comments:

L1-1 The DEIS does not indicate that both the proposed River Discharge and Wetland Discharge sites are within the Snoqualmie River Valley Agricultural Production District (APD), a designated resource area containing agricultural lands of long-term commercial significance. The following comments are intended to ensure that there is minimal impact to agriculture if either site is selected as the discharge site.

Conveyance Pipeline:

L1-2 Pipeline location: Portions of the pipeline that will be located on private property should be sited so that there is minimal impact to farming operations. For example, from an agricultural perspective it is usually preferable to locate pipeline easements along property boundaries rather than across the middle of a property. Another acceptable alternative is to locate the pipeline under an existing field road so that its installation does not disturb agricultural soils or take any additional property out of agricultural production.

L1-3 Pipeline installation: Burying the pipeline at a depth ranging from 3 – 8 feet is acceptable to the Agriculture Program as this depth is sufficient to allow it to be farmed over. We recommend a minimal depth of at least 3 feet as a shallowly buried pipeline could interfere with tillage operations.

Wetland Discharge:

L1-4 Portions of this proposed discharge site have recently been used for agriculture and because it is within the designated APD, the County has an obligation to maintain suitability for agricultural use on as much of the property as possible. The Agriculture Program concurs with the DEIS in that the areas having the lowest elevation should be selected as the discharge areas where wetlands will be created and/or enhanced. The DEIS states that because of soil composition, little contact is anticipated between the ground water and the surface and subsurface water in the wetland discharge site. However, we are concerned about lateral movement of the discharged water and the possibility that it may cause the water table in adjoining farmable areas to rise and result in their becoming too wet to farm. To reduce the likelihood of this occurring, we recommend that the design for this discharge site include sufficient excavation or other design feature, so that when discharge occurs, the elevation of the water in the newly created/enhanced wetlands is no greater than the current elevation of the water table.

Thank you for the opportunity to comment on the DEIS.

Local Governments

King County Agriculture Program (L1)

Response to Comment L1-1

The text has been revised in Chapter 9 sections 9.1.3.1 and 9.1.3.2 to indicate the river and wetland discharge sites are located within the Snoqualmie River Valley Agricultural Production District.

Response to Comment L1-2

King County Wastewater Treatment Division recognizes the Agriculture Program concerns regarding impacts to farming operations. The Wastewater Treatment Division seeks to utilize established right-of-ways and easements to the greatest extent possible. Locating wastewater facilities in the right-of-way would likely avoid impacts to farming operations. Please also see the response to the next comment (L1-3). If installation of a pipe in agricultural soils or currently farmed land is necessary the planned depth of installation should be sufficient to farm over.

Response to Comment L1-3

The project plans currently propose burying the pipeline to a depth of 3 to 8 feet. Please see the response to Comment L1-2 on other steps that will be taken to avoid disturbance to tillage operations.

Response to Comment L1-4

The wetland discharge alternative includes plans for the installation of swales to direct high water to existing streams or oxbow lakes. It is anticipated these swales will prevent the lateral movement of discharged water to areas where it could readily infiltrate to ground water. Other groundwater lateral movement is not expected because of the interaction between the ground water and surface water will be quite small even for water that is moved laterally off the discharge site due to the low permeability of the surface geology as discussed in Section 6.1.4.

A03P0173 - Carnation Wastewater Treatment Facility

Draft Environmental Impact Statement Floodplain Review Comments from DDES

L2-1

- If this Wastewater Treatment Facility was built it appears that undeveloped properties currently in the Carnation area would have homes built on them. Therefore it appears that potentially more people and their property will be located in the regulatory 100 year Floodplain than are currently. This is a major health and safety issue. The basis for Federal, State and King County Flood Hazard Codes is to limit development in the regulatory 100 year Floodplain. What method is proposed to eliminate or minimize adding people and property in the regulatory 100 year Floodplain?

L2-2

- Both of the proposed sites of the Wastewater Treatment Facility have been located on the current Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM). This FEMA FIRM (panel 53033C0418 G) was published on December 6, 2001. It appears that a majority of the proposed Weckwerth property (tax parcel # 2125079035) is located in an area that is determined to be outside of the regulatory 100 year Floodplain. The site currently owned by the City of Carnation (tax parcel # 1625079073) is located completely within the regulatory 100 year Floodplain. Therefore it appears that the best location of the Wastewater Treatment Facility would be on the Weckwerth property.

L2-3

- Removal of excess excavation and other material including construction materials should be removed from the regulatory 100 year Floodplain.
- During the flood season (September 30 to May 1) construction materials and all temporary structures and/or substances hazardous to public health, safety and welfare shall be removed from the regulatory 100 year Floodplain.
- The proposed "River Discharge Site" is located in King County's jurisdiction and within the FEMA Floodway and King County's Zero-rise Floodway. The proposed construction of outfall and installation of the conveyance piping will be required to meet the requirements of King County's Flood Hazard Code. The installation of this conveyance piping shall not change the existing topography in the regulatory 100 year Floodplain.
- The proposed "Wetland Discharge Area" is located in King County's jurisdiction and within King County's Zero-rise Floodway. The installation of the conveyance piping, proposed outfall and any proposed structures, etc. will be required to meet the requirements of King County's Flood Hazard Code.

King County Department of Development and Environmental Services (L2)

Response to Comment L2-1

Several Chapters of the Carnation Municipal Code (CMC) regulate land use in the 100-year flood plain including Chapter 15.88 – Environmentally Sensitive Areas Chapter 15.64 Floodways, Floodplains, and Erosion. The City of Carnation Shoreline Master Program also regulates development in the Floodplain. These regulatory tools would be used to manage development within the regulatory 100-year Floodplain.

Response to Comment L2-2

As was disclosed in the Draft EIS, a portion of each Wastewater Treatment Plant site is within the 100-year floodplain. The decision makers, the King County Executive in coordination with the Carnation City Council, will consider the impacts disclosed in the Draft and Final EIS when selecting a site for the treatment plant. Please see the response to comment Washington State Department of Natural Resources, S2-2 for further discussion of alternative selection. The final decision on where the facility will be located will be made through the consideration of policy criteria and environmental factors. Any portion of the wastewater treatment facility located in the 100-year floodplain would be designed to meet applicable federal, state, and local flood proofing and development standards.

Response to Comment L2-3

The King County Wastewater Treatment Division will work with the King County Department of Development and Environmental Services and the City of Carnation to make sure proposed facilities in King County's jurisdiction meet applicable regulatory requirements.

King County
Office of Business Relations and Economic Development
Historic Preservation Program
King County Courthouse, Room E-402
516 Third Avenue [MS: KCC-EX- 0402]
Seattle, WA 98104-5002

July 23, 2004

TO: Wesley Sprague, Environmental Planner, Wastewater Treatment Division

FR: Charlie Sundberg, Preservation Planner

RE: Carnation Wastewater Treatment Facility Draft Environmental Impact Statement

The following comments pertain to Chapter 13 (Cultural Resources) of the DEIS. Overall the chapter is an appropriate and adequate assessment of cultural resource issues raised by the proposed project. There are a few minor errors of fact that should be corrected and one issue that seems to be incompletely addressed.

L3-1 On page 13-2 in the first paragraph it is not clear that the City of Carnation has a landmarks ordinance and that the King County Historic Preservation Program provides services to the City through an interlocal services agreement signed in 1994. King County has no jurisdiction within the city boundaries. The City landmarks ordinance is codified in CMC 15.96.

L3-2 As a result of this jurisdictional issue, the "Listing Status" column of Table 13-1 on page 13-4 should be corrected to note that the Entwistle House, IOOF Hall and Commercial Hotel are City of Carnation landmarks, not King County landmarks. On the other hand, the Hjertoos Farm is a King County landmark, and the Stossel Bridge has been found eligible for the National Register, listings not identified in the table. The Dairy Farm Properties MPD should be eliminated from the table because it is a form of contextual history, not a property.

L3-3 The issue that is insufficiently discussed is the City's wastewater collection system, which is entirely contingent upon construction of the treatment system. This is mentioned only in passing in the introduction on page 1-1. The adverse effects of construction of the collector system will occur whenever it is built, not just if construction occurs at the same time as construction of the treatment system, as suggested on page 13-16. Because of proximity to the Tolt-Snoqualmie confluence, known sites and ethnographic information, much of the city is considered to have high potential for archaeological resources. Construction of the collector system has "a potential" (p. 13-16) and is highly likely to adversely affect unrecorded archaeological resources

L3-4 and could directly affect historic buildings as well. Many historic buildings in Carnation occupy small lots, particularly those along Tolt Avenue, and have been unable to expand due to septic system limitations. Thus construction of the complete sewerage project "could" (page 13-16)

King County Historic Preservation Program (L3)

Response to Comment L3-1

Chapter 13, Section 13.1.1 has been revised to provide clarification on the regulatory authority over cultural resources in the project area.

Response to Comment L3-2

Table 13-1 has been revised as recommended.

Response to Comment L3-3

The City of Carnation will conduct a National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA) review of the sanitary sewer collection system project. As part of these reviews the city will work with a professional consultant to assess the proposed action. For further information please contact the City of Carnation at (425) 333-4192.

Response to Comment L3-4

The King County Wastewater Treatment Division agrees that potential for indirect impacts to historic buildings could increase as a result of development following the treatment plant.

L3-4 and is highly likely to have adverse indirect effects due to greatly increased development pressure.

L3-5 The DEIS should reiterate in Chapter 13 that the City will conduct what amounts to a second phase of the complete wastewater treatment system and that the adverse impacts of collector system construction will be addressed in subsequent SEPA documents. As with the current project, the collector system's direct impacts on unrecorded archaeological resources can be

L3-6 mitigated through archaeological surveying, monitoring if necessary, and data recovery. Direct and indirect/cumulative impacts to historic buildings can be mitigated through measures such as physical monitoring and protection, designation of eligible properties as City landmarks, design review and related measures.

Thank you for the opportunity to review and comment on this proposal. Please contact me if you have any questions about these comments.

Response to Comment L3-5

This section has been modified as requested. Please see the response to L3-3 for further information on the NEPA and SEPA environmental review of the sanitary sewer collection system.

Response to Comment L3-6

Please see the response to L3-3 for further information on the SEPA review of the sanitary sewer collection system.

CITY OF CARNATION

August 9, 2004

Don Theiler, Division Director
Department of Natural Resources and Parks
Wastewater Treatment Division
King Street Center, KSC-NR-0505
201 South Jackson Street
Seattle, WA 98104

Dear Mr. Theiler:

It has been a pleasure to work with the staff from the Wastewater Treatment Division on this very important project. The staff continues to provide excellent support and continually work towards providing sewer service to the City of Carnation. I am writing this letter on behalf of the City of Carnation City Council to provide comments on the Carnation Wastewater Treatment Facility Draft Environmental Impact Statement (EIS) prepared in compliance with the State Environmental Policy Act (SEPA) (RCW 43.21C) the SEPA Rules (WAC 197-11), and Chapter 20.44 King County Code, Implementing SEPA in King County procedures for Carnation Wastewater Treatment Facility.

The City of Carnation strongly agrees with the purpose of and need for the project stated in Chapter 1 of the EIS. Without this project the City will continue to rely on on-site wastewater treatment and disposal systems. Because many of these systems are old and/or not designed to properly treat wastewater, they pose a growing threat to public health and the environment. Furthermore, the small sizes of many lots in the City make it extremely difficult for proposed development and redevelopment on these lots to meet health department regulations for on-site wastewater disposal. This limits the City's ability to implement its adopted comprehensive land use plan consistent with the Growth Management Act. It has also resulted in the loss of businesses. Existing businesses have been forced to close in some cases and locating new business is often impossible. The loss of business is eroding the City's tax base, impairing the City's ability to provide essential services. This could ultimately threaten the economic viability of the City. For these reasons we feel strongly that the proposed wastewater treatment facility is essential to Carnation's future.

Overall we find that the Draft EIS does a good job of evaluating the potential environmental impacts of the proposed project. Following are our comments on specific sections.

Chapter 1, p. 1-5 1.3 Benefits and Disadvantages of Reserving for Some Future Time the Implementation of the Proposal.

We request to have the second paragraph to read, beginning with the words move ahead to **"move ahead because of the "public health hazard" and because any situation hazardous to human health is also a threat, and sometimes even more of a hazard to environmental health. In this case, with Carnation's proximity to vital salmonid habitat that includes prime Chinook spawning areas, to not go ahead is unconscionable."** L4-1

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City of Carnation (L4)

Response to Comment L4-1

Thank you for your comment. The text of this section has been changed to reflect this information

Chapter 1, p 1-7 1.5.1 Treatment Plant Site Alternatives.

The City Council would like a reference that the city-owned site has a potential of two access routes to it as opposed to the Weckwerth site only having a single access and current truck use to that access. L4-2

Chapter 3, p 3-5 Site Location and Characteristics.

The City Council would like to see a reference that the City-Owned site currently has limited number of neighbors and the Tolt Middle School's student population proximity to the Weckwerth site. L4-3

Chapter 3 p. 3-10 & 11 3.1.4 No Action Alternative.

We would like to request language be added to this section to express the following:

If a treatment facility is not built, Carnation is left to a precarious and uncertain future. Businesses will continue to leave and new businesses will find it even more difficult if not impossible to locate here. The businesses that are able to stay or start up will most likely be those that do not provide the core tax base a city needs to provide services and remain financially viable. L4-4

Chapter 4, p 4-16 4.2.5 No action alternative.

We would like to request the following language be incorporated into this section that integrates the following:

"... ground water contamination occurrence would continue and increase, not only less treatment than provided by a treatment plant, but in many cases, no treatment, and just direct discharge into the ground water." L4-5

Chapter 6, p 6-32 6.2.5 No Action Alternative.

Added language the City Council would like to see in this section is the following:

No only will the approximate 50% of old systems continue to fail, many of the newer systems also could fail, due to improper use and/or failing drain fields or lack of reserve areas. Also, most of these newer systems do not fall under the Seattle/King County Health Department's current on-site septic requirements which increase their susceptibility for ground water contamination. L4-6

Chapter 11 p 11-12 11.2.5 No Action Alternative.

The City Council requests that the following be added to the first sentence:

"..Also could lead to decrease in use of school sports facilities, if drain field reserves or new drain field construction would require use of those areas." L4-7

Chapter 15 p 15-10 15.2.4 No Action Alternative.

The City Council would like to see the following reflected in the first sentence:

"... public services currently find it difficult, if not impossible to add on to their facilities. This would continue, as would the difficulties and impossibilities for new services to locate in Carnation and existing services remain." L4-8

Response to Comment L4-2

Chapter 14, Sections 14.1.2.1 and 14.1.2.2 have been changed to reflect this information.

Response to Comment L4-3

Chapter 3, Section 3.1.1.3: has been changed to indicate the proximity of the school to the Weckwerth site.

Through reviewing aerial photographs and site visits it has been determined that the City-owned site has more neighbors, including an apartment building, than the Weckwerth site. King County Wastewater Treatment Division agrees that the student population of Tolt Middle School would result in a large number of individuals in closer proximity to the treatment plant should the Weckwerth site be selected.

Response to Comment L4-4

The potential land use impacts of no action are discussed in Chapter 9, Section 9.2.4. SEPA does not require evaluation of economic issues.

Response to Comment L4-5

The language has been incorporated into the text.

Response to Comment L4-6

This text has been added to this section.

Response to Comment L4-7

This text has been added to this section.

Response to Comment L4-8

This text has been added to this section.

The City Council is also supportive of the concerns expressed by the Riverview School District. The safety and health of our children are paramount in our desires that this project be a benefit to all citizens and businesses in the City of Carnation. L4-9

We look forward to your continued support on this very important project.

Sincerely,

Bill Brandon
City Manager

CC City Council
Roth Hill Engineering
Phil Olbrechts, City Attorney
PCS Group

Response to Comment L4-9

Please see the responses to the comments from the Riverview School District.

32240 NE 50th Street • Carnation, WA 98014 • (425) 844-4500 • FAX (425) 844-4502
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RIVERVIEW
School District No. 407

July 27, 2004

Environmental Planning
King County Dept. of Natural Resources and Parks
Wastewater Treatment Division
King Street Center, M.S. KSC-NR-0505
201 South Jackson Street
Seattle, WA 98104-3855

Re: Carnation Wastewater Treatment Facility Draft EIS

I am writing this letter on behalf of the Riverview School District to provide comments on the possible sites for the Carnation Wastewater Treatment Facility. While our school district is supportive of the wastewater treatment plant, we do have numerous concerns regarding the Weckwerth site which borders Tolt Middle School in Carnation.

O1-1 One of our areas of concern is air quality in Chapter 5. Our school district would like to request that additional information be provided on why no significant impacts to air quality are anticipated during construction and how adverse impacts can be mitigated with construction best practice and through compliance with applicable permit requirements and conditions.

O1-2 On page 5-5 it states that the impacts to air quality during construction are not expected to be significant. We strongly disagree and believe that there will be very significant impacts on our 700+ students and staff and our educational environment during construction. The Environmental Impact Statement Draft stated the following impacts over 18 to 24 months construction phase:

1. fugitive dust generated by workers' vehicles & equipment
2. vehicle exhaust generated by workers' vehicle & equipment
3. fugitive dust and diesel fumes from excavation
4. odors from asphalt paving
5. traffic flow due to construction equipment, material hauling and detours for excavation and grading
6. increased traffic emissions due to construction delays
7. noise and dust from 645 truck trips hauling excavated materials and loose soil
8. construction from 7:00 AM to 7:00 PM, conflicting school in session, and
9. possible release of containments (HAPs & TAPs) if cleanup of contaminated soil is required.

The Riverview School District, as an extension of the greater community, and working in tandem with the family, will educate all children to become responsible citizens with a passion for learning, a foundation of skills, knowledge and experience; and with the creativity and resiliency to thrive in a dynamic world.

Special Districts and Other Governmental Entities

Riverview School District (O1)

Response to Comment O1-1

Chapter 5, Sections 5.2.1.3 and 5.2.2.3 have been revised to provide more detail on construction air quality impact mitigation measures that could be used at the treatment plant sites. With respect to mitigation through permit requirements, the grading and/or building permit issued by the City of Carnation would require dust control. In addition, the Puget Sound Clean Air Agency requires that projects meet performance standards for dust and vehicle emissions.

If the Weckwerth site were chosen, King County would apply the appropriate mitigation measures to minimize the air quality impacts of construction. With these measures and because the impacts would be temporary these impacts are not expected to be significant. King County would work with the School District to make sure all reasonable measures were taken to reduce potential air quality impacts.

Response to Comment O1-2

Please see the response to the previous comment.

July 27, 2004
Page 2

O1-3 During operation of the treatment plant, air quality could affect our 700+ students and employees in the following ways:

1. odor emissions during warm weather and at points of turbulence within the collection and treatment process
2. odor impact to surrounding property (Tolt Middle School) during operation and with breezy weather conditions, and
3. release of volatile organic compounds (VOCs) or aerosols.

O1-4 In addition, during storage of solids or pumping into transport trucks, odor would be released affecting Tolt Middle School. Also employee vehicles and truck haul trips would contribute to air pollutants and odors.

O1-5 On page 5-9, it states that students and employees of the adjacent school could experience fugitive dust and exhaust odors since construction hours would coincide with school hours. From our view, Tolt Middle School would be heavily impacted with dust and odors during the construction phase.

O1-6 In Chapter 10, Environment Health, noise impact is described. On page 10-2, it states that treatment plant construction noise is exempt from WAC 173-60-050. While it is exempt, treatment plant construction noise would have a huge impact on student learning at Tolt Middle School. The Weckwerth site is adjacent to our campus with classrooms within 35' of the road and potential construction 64' from classrooms.

O1-7 The draft also states that the impact would not be expected to be significant to the general community. Again, while it may have minimal impact on our community, Tolt Middle School students and staff will be heavily impacted by noise during the 18 to 24 month construction phase. Heavy equipment such as dozers and backhoes and heavy trucks emit loud noises. The study also states that diesel powered construction equipment makes more noise than gasoline powered vehicles. They also state that the low frequency of diesel engines travels farther and can impact older homes with single-pane windows and less insulation. Our classrooms which are located closest to the construction site are 20 year old portables with single pane windows and less insulation than regular school buildings.

O1-8 The study states that adjacent properties would unavoidably be exposed to construction noise including worker vehicle engines, heavy trucks delivering materials, and small equipment such as drills, saws and hammers. In addition, our students and staff would also be exposed to noise from demolitions and construction activities, engines and back up alarms. Also spills of fuels, oils, lubricants, or other substances can occur during transport or on-site during construction.

Response to Comment O1-3

The operation mitigation measures described in Section Chapter 5, Section 5.2.1.3 would minimize these impacts.

Response to Comment O1-4

The measures described in Chapter 5, Sections 5.2.1.2 and 5.2.1.3, would keep odors from solids handling (including storage) at low levels. As the discussions in these sections indicate, solids would be in enclosed containers at all times. Air from solids storage tanks would be passed through the odor control system described in Section 5.2.1.3 before being released to the atmosphere. Stored solids would be pumped through hoses to sealed tanker trucks for transport. The hoses would be connected to the trucks before any solids were pumped through them. As a result, very little odor would be released during the transfer.

As discussed in Chapter 14, Section 14.2.1.2, during operation the treatment plant would only generate about 10 to 16 one-way truck and auto trips per week. This small number of trips is not expected to produce substantial air pollution or odor.

Response to Comment O1-5

Please see the response to comment O1-1 above.

Response to Comment O1-6

Chapter 10, Section 10.2.1.1 has been revised to list two more construction noise impact mitigation measures that could be used at treatment facility sites. Later in that section additional mitigation measures have been added to the list of those that could be used to minimize operation noise impacts.

If the Weckwerth site were chosen, King County would apply the appropriate mitigation measures to minimize the noise impacts of construction and operation. With these measures these impacts are not expected to be significant. King County would work with the School District to make sure all reasonable measures were taken to reduce potential construction and operation noise impacts.

Response to Comment O1-7

Please see response to comment O1-6, above.

Response to Comment O1-8

Please see the response to comment O1-6, above for potential measures to minimize construction noise.

Please see Chapter 10, Section 10.2.1.1 for potential measures to prevent and contain chemical spills during construction.

O1-9 Section 10.4, Significant Unavoidable Adverse Impacts, states no significant adverse environmental health impacts are anticipated from construction or operation of the treatment facility alternatives. The School Board and Administration of the Riverview School District totally disagrees. We believe that the noise will have a huge impact on student learning over an 18-24 month construction period. This section contains nineteen words stating no significant impact. It is difficult for us to understand how anyone would not realize the huge impact on our students.

O1-10 The Riverview School District is very interested in participating in any activity which will assist the aesthetics of the treatment plant addressed in Chapter 12. If possible, our district would like to use the treatment as an educational site for class tours, etc.

O1-11 In Chapter 14, Transportation, there is no mention that the Weckwerth site is in a school zone. It seems that Section 14.1.2.2, 14.1.4.2, 14.2.1.2, 14.3 should all reference that this area is in a school zone.

O1-12 To the Riverview School District, transportation is another large impact with the Weckwerth site. The study states that during the 18 to 24 month construction cycle, approximately 3,500 one-way vehicle trips will impact the Tolt Middle School school zone. This has a definite impact on our school district safely transporting our students to and from school, arrival and departure time for staff, parents transporting their children to school on their way to work, classes beginning on time, and the normal car and truck traffic identified in Section 14.1. In addition, if this added congestion at Tolt Middle School causes our buses to depart later than scheduled, all of our elementary schools will also be impacted. These same buses provide transportation for students K-12. The prompt arrival and departure of our school buses are essential to the rest of the school district effectively educating our students with class beginning on time and not enduring classroom disruptions due to transportation delays.

O1-13 Chapter 15, Environmental Impact and Mitigation, also fails to identify that the Weckwerth site is in a school zone. Section 15.2.1.1 mentions law enforcement and fire and emergency service but fails to mention the impact on another public service – Tolt Middle School.

O1-14 Section 15.2.1.3 needs to elaborate on how school zone impacts will be mitigated, how emergency services will be coordinated with the school district and how Tolt Middle School and Carnation Elementary School will be addressed in the Hazardous Materials Spill Prevention Plan.

Response to Comment O1-9

Please see the response to comment O1-6, above.

Response to Comment O1-10

King County conducts tours for school students at its existing treatment plants. We will work with the school district to identify educational opportunities associated with the treatment facility.

Response to Comment O1-11

Chapter 14, Section 14.1.2.2 has been revised to identify the school zone associated with the Tolt Middle School on Tolt Avenue.

Response to Comment O1-12

Chapter 14, Section 14.2.1.3 has been revised to add a measure to minimize construction traffic during peak morning and afternoon student transportation periods associated with Tolt Middle School. King County expects this and the other mitigation measures described in Section 14.2.1.3 to ensure that construction traffic would not disrupt transportation to and from the school.

Response to Comment O1-13

Chapter 15, Section 15.1.2.1 has been revised to identify the school zone associated with the Tolt Middle School on Tolt Avenue.

Chapter 15, Section 15.2.1.1 has been revised to address public schools.

Response to Comment O1-14

Since a school zone only addresses vehicle speed limits, the project should have no impacts on the school zone.

If an emergency situation occurred at the facility, King County would notify the fire department and the fire department would be responsible for coordination with local schools. As part of the permit application process, King County would prepare the emergency response and hazardous spill prevention plans and submit them as appropriate with its building permit application to the City of Carnation or the fire department. The plans would describe the substances to be used and stored on the site and the manner of their use and storage. Safety measures would also be described. The City and/or fire department would review the plans to make sure they met their requirements. Any aspects of the plans that did not meet these requirements would have to be revised so that they did. The fire department would periodically inspect the facility to ensure continued compliance with its regulations.

Once the plans were approved, the fire department would be aware of the types, volumes, locations and other relevant aspects of substances on the site. In this way the fire department could make sure it had access to the resources necessary to deal with releases of any of these substances.

O1-15 In the Draft Environmental Impact Statement, technical memorandums, page 904, section 3.1.7 chemical delivery, states that large trucks up to 72 feet long deliver chemicals. This requires an exterior concrete pad designed for containment of any overflow. The chemical delivery and containment of any overflow also are great concerns to the school district. If an accident occurs and chemicals are exposed, we have over 700 students and staff within feet of accidents.

O1-16 In addition to concerns and impacts stated in the study, we have children with very delicate health and handicapping conditions. One child is legally blind and is dependent on sound to hear and learn. Any noise is a problem, let alone major construction noise which would make learning impossible. Another child is extremely sensitive to odors and has physical reactions. Many safeguards are presently in place to assist the student and minimize impact on learning. Chemicals, diesel fumes, and asphalt installation during construction would have a huge impact on the health of this student. Even the odors and chemicals from the operation of the treatment plant would potentially affect the health of this student.

O1-17 While the 18 to 24 month construction phase would negatively impact all of our students and staff, special education children would be especially impacted. These are the students who are especially sensitive to noise and distractions. A minor construction or remodeling project would create educational issues for these students. A major construction project, like a waste treatment facility, would create huge issues for these special students.

In conclusion, the Riverview School District is supportive of a waste treatment plant in Carnation, but believes that the Weckwerth site is an extremely poor choice due to the negative impact on 700+ students and staff who are within feet of the site. We are of the understanding that the city-owned site is less expensive, has more acreage, and would negatively affect far less people.

Thank you for the opportunity to provide comments on this matter.

Sincerely,

RIVERVIEW SCHOOL DISTRICT

Conrad Robertson

Conrad Robertson
Superintendent of Schools

cc: Riverview School Board of Directors
Carnation City Council

Response to Comment O1-15

The list of measures to minimize accidental leaks and spills during operation common to all treatment facilities in Chapter 10, Section 10.2.1.1 has been expanded to provide more detail on measures that could be taken to minimize the risk of and respond to accidental leaks or spills during operation of the treatment facility. These measures include sloping of spill-prone areas toward the treatment plant so that any spilled substances would drain back to the plant for treatment. Areas where chemicals would be transferred from trucks would be sloped in this manner.

Chapter 10, Section 10.2.1, subsection "Accidental Spills During Operation of the Treatment Plant" has been revised to point out that in the event of a spill none of the chemicals used at the plant would cause impacts beyond the immediate vicinity of the spill.

Response to Comment O1-16

Please see the responses to comments O1-3 and O1-6.

Response to Comment O1-17

Please see the responses to comments O1-3 and O1-6.

July 27, 2004

Environmental Planning and Community Relations Unit
King County Wastewater Treatment Division
201 South Jackson Street
Seattle, WA 98104

To Whom it May Concern:

The Snoqualmie Watershed Forum appreciates the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for the Carnation Wastewater Treatment Facility. The Snoqualmie Watershed Forum operates under an interlocal agreement between King County and the Cities of Carnation, Duvall, Snoqualmie and North Bend and works to improve salmonid habitat and water quality and to address flooding concerns in the Snoqualmie Watershed. Over the past four years, the Snoqualmie Watershed Forum has actively participated in the development of the Snohomish River Basin Salmon Conservation Plan. This plan is designed to meet the needs of Chinook and coho salmon and bull trout in Water Resource Inventory Area (WRIA) 7.

In a letter submitted during the scoping phase of this DEIS, the Forum strongly supported the use of advanced levels of treatment to reclaim the wastewater for beneficial uses. The Forum supported the use of highly treated water for mitigating any impacts of this project. The Forum continues to support considering using reclaimed water from the facility for irrigation of local farms or parks or in a wetland restoration project.

O2-1 Of the three discharge Alternatives in the DEIS, the Snoqualmie Watershed Forum encourages the selection of the Expanded Wetland Discharge Alternative wherein highly treated water would be used to create and/or modify wetlands in the Stillwater Wildlife Area north of Carnation. The Forum endorses this discharge alternative for the following reasons:

O2-2
1) The Wetland Discharge Alternative could provide the benefits of enhanced off-channel rearing habitat for Chinook and coho salmon in the Snoqualmie River.
   a. The Ecological Analysis for Salmonid Conservation written by the Snohomish Basin Salmon Recovery Technical Committee identifies that a dearth of off-channel rearing habitat is a limiting factor for Chinook salmon in the Snoqualmie River.
   b. Harris Creek is a highly productive basin for coho salmon, which rely heavily on wetland habitat for rearing and overwintering. The Snoqualmie Watershed Forum is very interested in preventing the future listing of coho salmon under the Endangered Species Act. The Enhanced Option of this alternative could provide significant benefit for this species.

O2-3
2) The Wetland Discharge Alternative, when compared with the River Discharge Alternative, would result in less disturbance of critical Chinook salmon habitat in

Snoqualmie Watershed Forum (O2)

Response to Comment O2-1

King County will continue to evaluate this and the other discharge alternatives discussed in the EIS to determine the optimal approach.

Response to Comment O2-2

Chapter 7, Section 7.2.2.2, Expanded Wetland Discharge Option has been changed to note these benefits.

Response to Comment O2-3

Table 3-3 has been changed to indicate that construction of the river discharge alternative has a greater potential to adversely affect Chinook salmon habitat than the other discharge alternatives.

Chapter 3, Section 3.1.2.1 describes the construction of the river discharge. As that section states, construction would consist of installing an 8 to 10-inch pipe. Measures to minimize impacts and restore habitat are described in that section as well.

Chapter 7, Section 7.2.2.1 describes the potential adverse impacts of river discharge construction on salmon. As pointed out in that section, compliance with permit conditions and use of the types of mitigation measures described in the EIS should keep the magnitude of these impacts at a minor level.

Given the minor, short-term nature of construction, the measures that would be used to minimize impacts, and the minor infrequent nature of maintenance, it appears unlikely that the river discharge alternative would be counterproductive to salmon recovery efforts.

5

the Snoqualmie River, thereby causing the least amount of harm to local Chinook salmon populations.

O2-3

a. The mainstem of the Snoqualmie River below the confluence with the Tolt River is a very productive Chinook salmon spawning area. The amount of construction needed to install and maintain the River Discharge Alternative could be counterproductive to the salmon recovery efforts planned for this area.

O2-4

3) Because of the unknown impacts of Endocrine Disrupting Chemicals (EDCs) in highly treated water, the Wetland Discharge Alternative would minimize the potentially deleterious impacts of effluent by using the natural filtration of a wetland system to further purify water before entering the river.

4) And finally, the Snoqualmie Watershed Forum supports the Wetland Discharge Alternative because it provides opportunity to showcase the multiple benefits for people and fish resulting from large-scale construction and mitigation projects in the Snoqualmie Watershed. Projects such as this may help demonstrate that what is beneficial for people can also be beneficial for fish.

Thank you for the opportunity to comment on this process. If you have any questions, please contact James Schroeder, Snoqualmie Watershed Forum staff, at 206-206-8309 or at james.Schroeder@metrokc.gov.

Sincerely,

Mark Sollitto
Chair
Snoqualmie Watershed Forum

cc: Snoqualmie Watershed Forum Members
Sandra Kilroy, Snoqualmie Watershed Coordinator

Response to Comment O2-4

Some scientific studies have shown that EDCs are further degraded in wetland environments. It is still uncertain, however, whether and to what extent this may occur. The treatment facility would be designed to produce highly treated water that met State of Washington reclaimed water standards before this water was discharged to the wetlands. Additional treatment by the wetlands, while likely, is not included in facility planning.

June 28, 2004

Carnation City Council Members and King County Engineers,

My name is Jack Moyer.
I am writing as representative of Camp Gilead, of which I am the Director.

As you may know, Camp Gilead is directly across the river from the proposed sewage treatment outfall at the Carnation Farm Bridge.

Camp Gilead is a year round Christian camp and retreat center, in operation since 1948.
During the summer we have 200 youth attending 10 one-week sessions, the remaining 42 weeks hosting Church retreats and conferences. During an average year we see 4000 guests on our facility.
Camp Gilead strives to provide quality character building programs, a part of which is the utilization of the Snoqualmie River for inner-tubing, canoeing and other recreational activities.

G1-1 | It is my opinion that locating the outfall at the Carnation Farm Bridge will significantly impact the attendance of Camp Gilead in two ways. First, parents will be reluctant to send their youth where there is potential contamination due to
G1-2 | exposure in the river. Secondly, the potential odor from gases released with the
G1-3 | treated water will impact our year – round program. **Reduced attendance translates into a large economic impact for our non-profit ministry.**

G1-4 | Lastly, my own home is located less than 100 yards from the proposed site, and I have no doubt that my family's quality of life will be drastically reduced by this proposal.

G1-5 | I urge you to consider alternate locations and alternative disposal means.

Thank you,

Jack L. Moyer
Director

Groups, Organizations, and Businesses

Camp Gilead (G1)

Response to Comment G1-1

As discussed in Chapter 10, the environmental health risks to recreational users of the river from exposure to highly treated water from the treatment facility would be negligible due to the high level of treatment, short duration of exposure and rapid dilution. Please see Chapter 10 for a more detailed discussion.

Response to Comment G1-2

No odor is expected from the river discharge facility. See page 5-10, "Operation Impacts at River Discharge."

Response to Comment G1-3

Because a river discharge would cause no odor and negligible environmental health risks it would not affect camp attendees. If the river discharge option were selected, King County would be available to meet with you, other members of your organization, and guests to ensure that your issues and concerns were understood and addressed.

Regardless of the discharge option selected, King County would have to obtain a discharge permit from the Washington State Department of Ecology. The permit would contain discharge limits, monitoring and reporting requirements, and other provisions to ensure that the discharge did not harm water quality or people's health. Monitoring and reporting requirements would demonstrate that the permit requirements were being met.

Response to Comment G1-4

As indicated in the responses to your earlier comments, there would be no odor from a river discharge facility and the environmental health risks from the facility would be negligible for the reasons given. In addition, no significant aesthetic impacts are expected (see Chapter 12).

Response to Comment G1-5

Carnation and King County evaluated a number of alternative discharge locations and methods. See Chapter 2, Section 2.4 and Chapter 3, Section 3.4 for discussions of these evaluations. The EIS evaluates three discharge alternatives. Decision makers will take the environmental impacts of these and the treatment plant and conveyance alternatives into account along with non-environmental factors such as cost and community impacts in choosing a discharge facility.

July 26, 2004

Don Theiler, Director and SEPA Responsible Official
Wastewater Treatment Division
KSC-NR-0505
King County Department of Natural Resources and Parks
201 South Jackson Street
Seattle, WA 98104-3855

RE: **Draft Environmental Impact Statement**
City of Carnation Wastewater Treatment Facility

Dear Mr. Theiler:

This letter summarizes our review of the upland disposal alternative for the proposed Carnation Wastewater Treatment Facility and its potential impact on groundwater quantity and quality. The Draft Environmental Impact Statement and Technical Memoranda 5 and 5a were reviewed.

I1-1 We are astonished at the lack of data in these documents to justify the conclusions stated in the text. This Environmental Impact Statement is the document that will be used by the decision maker, King County Executive Ron Sims, as a basis for choosing a wastewater treatment plant site and a discharge alternative. Yet this document does not provide enough information for the Executive to make an informed decision as to the viability of the upland discharge alternative.

I1-2 Our Scoping comments in September 2003 noted that for upland disposal to work, groundwater levels are required to be 15-20 feet below the surface. We requested that the City and County perform the necessary groundwater analysis as part of this EIS to provide site-specific data on current and winter high groundwater levels for the proposed infiltration sites and properties along the groundwater flow path below the infiltration sites. This was not done.

We asked for identification and mapping of all existing drainfields, shallow wells, natural springs and homes with basements along the groundwater flow path downstream of the proposed infiltration site to the point where the effluent is intercepted by a stream, wetland, pond or the Snoqualmie River. This has not been provided.

We asked for clear identification and documentation of all areas where the groundwater has reached the ground surface during wet winter periods and perennial springs. This work has not been done.

We requested a detailed analysis of the groundwater elevation fluctuations that normally occur within the proposed upland infiltration site and associated downstream flowpath, and for an analysis of the impact of the additional input to groundwater from the upland infiltration system with respect to the existing natural groundwater fluctuations and to natural spring flows. Estimates and hypothetical statements are all that is included in this document.

Individuals

(Organized in alpha order by last name)

Casey (I1)

Response to Comment I1-1

More detail has been added to the upland discharge discussion. Please see the revised text in Chapter 6, Section 6.2.3.3. This additional information does not include site specific work in the upland discharge study area because King County has been unable to gain access to the proposed upland discharge study area. Because of this King County agrees that a level of uncertainty exists in the data used to determine the feasibility and environmental impacts of the upland discharge alternative. Given this level of uncertainty, the Final EIS, as prescribed by SEPA, presents a worst case analysis of the upland discharge alternative's potential environmental impacts for the decision-makers to consider when selecting alternatives. Please see Chapter 6 Section 6.2.3.3 for a discussion of the worst case analysis.

Response to Comment I1-2

Please see the response to comment I1-1 for a discussion of the data used to determine the environmental impacts of the upland discharge alternative. Also, for a discussion of the likely groundwater flow paths and well log data please see the revised text in Carnation Wastewater Treatment Facility Technical Memorandum No. 5A Upland Disposal Alternatives. The anticipated natural rise in water levels in the winter is approximated from the water level data collected from September 2003 through February 2004 in one of the City's monitor wells as discussed in Section 3.4 of Technical Memorandum No. 5A. Although this well is not specifically in the upland discharge study area, the change in water levels seen over the winter should be very similar in the study area. Specific identification of water levels, flow paths, discharge points, etc. in the upland disposal study area could not be accomplished due to King County being unable to secure access to the study area. However, the studies accomplished at the City's property, along with the studies of well logs and other available information from the area are sufficient to characterize the likely behavior of ground water beneath the study area as discussed in Section 3.4.

Draft Environmental Impact Statement

I1-3 Section 2.4.2 discusses the background for the upland discharge alternative. It states "an extensive on-site hydrogeologic study would be necessary to confirm the suitability of a specific site in this area. This study has not been conducted. King County has been unable to gain access to the parcels and the hydrogeologic study would entail exorbitant cost. King County determined that since the project is still in the planning stage, the high cost of the study is not justified at this time." Therefore, the information required to determine whether or not upland disposal is even possible at a particular site cannot be provided until access is gained to the property and the extensive (and expensive) hydrogeologic study is performed.

I1-4 Section 6.1.2.5 notes that the Langlois Creek watershed is the source of Carnation's municipal water supply. It states that water quality and quantity data were not readily available for Langlois Creek. Surely the City and/or Departments of Ecology or Health have water quality data for the Carnation municipal water supply?

I1-5 Section 6.1.4 attempts to draw conclusions about the groundwater in this area without any data to base it on. Therefore, the statements are all generalizations (emphasis added):

> "The shallow aquifer is generally found at 15 to 20 feet below ground surface...It is believed that much of the water infiltrates downward to a shallow aquifer below...The shallow aquifer probably also discharges to local streams and wetlands...all water appears to be drawn from deeper aquifers."

I1-6 Section 6.2.3.3 describes operational impacts from the upland discharge alternative. It reveals that "access to the upland discharge area was limited, so site-specific information was not available at the time of this writing". Then it states "it is assumed that the proposed upland discharge sites have soil and groundwater conditions similar to those at the City-owned landfill site". There is no basis for this conclusion in the data presented in the DEIS or Technical Memoranda.

I1-7 This section continues with a discussion of "groundwater mounding" that occurs when the infiltrating water backs up instead of continuing to drain downward. "In some cases, the mounded groundwater may even show up as wet areas on the surface of the ground, which is then called groundwater flooding". Most significantly, the following statement indicates a severe environmental impact from groundwater mounding:

> "[Based on field studies at the Carnation landfill] the shallow aquifer is much less permeable than the geologic materials found at the surface. Mounding calculations indicate that with such a low permeability, the water table would mound and would, under proposed application rates, become totally saturated. This would raise the water table surface and could cause localized flooding.
>
> For an infiltration basin to drain properly, a minimum of 2 feet is required between the bottom of the basin and the top of the groundwater mound. The 5 feet of material (gravel) at the surface on the City's landfill property that was investigated as part of this study is too thin to properly allow for infiltration. It is likely that gravel would need to be consistently 15 feet thick or more across an application area for infiltration to be feasible. Additional site-specific investigation would be required to determine if the soils would have a sufficient thickness of material (gravel) to support infiltration and this disposal option."

Response to Comment I1-3

Please see the response to comment I1-1 for a discussion of the data used to determine the environmental impacts of the upland discharge alternative.

Response to Comment I1-4

The City of Carnation does not monitor the surface waters in the Langlois Creek watershed. A previous City of Carnation hydrogeologic study determined that the springs from which the municipal water supply is drawn are true ground water and not a surface water source or under the direct influence of surface water (Carnation, 2000). *Carnation, City of, 2000. Comprehensive Water System Plan. Carnation, WA: City of Carnation.*

Response to Comment I1-5

The intent of Section 6.1.4 is to characterize the existing groundwater resources in the project area. Generalizations are used because of the variation in groundwater characteristics over the 240-acre upland discharge study area.

Response to Comment I1-6

Please see the response to comment I1-1 for a discussion of the data used to determine the environmental impacts of the upland discharge alternative.

Response to Comment I1-7

Please see the response to comment I1-1 for a discussion of the data used to determine the environmental impacts of the upland discharge alternative.

I1-7 Yet earlier this document indicates that the site-specific investigation needed to determine the viability of this alternative has not been performed.

Technical Memorandum No. 5A, Upland Disposal Alternatives, Carollo Engineers, Robinson & Noble, Inc. Three monitoring wells were drilled on the southern half of the City-owned landfill property for this study. Water levels were determined for these wells during the dry late-summer period when groundwater levels are known to be at their lowest (see Geohydrology and Ground-Water Quality of East King County, Washington, USGS Report 94-4082). Two other wells located near the landfill were monitored from September 2003 through February 2004. This document notes "TM5 presented a generalized geologic and hydrogeologic setting for the upland area containing the five parcels being investigated as potential infiltration sites...However, because site access was not available for the parcels, a definitive statement cannot be currently made."

I1-8 Section 3.3 states that "surface water and wetland surveys were not conducted on the six potential sites because of access limitations". The document then cites the King County Wetland Inventory and the National Wetland Inventory, and aerial photo interpretation. Neither of these two inventories is a comprehensive evaluation of wetlands, much less streams in a particular area. The King County inventory did not thoroughly evaluate wetlands in the eastern part of King County. Aerial photo interpretation does not work in heavily forested areas, such as the area around Camp Don Bosco near the proposed upland infiltration sites. Given the testimony at previous meetings that there are springs in this vicinity, it is essential to perform on-the-ground investigation prior to choosing an upland infiltration site.

I1-9 Section 3.4 reports that the groundwater level in the monitoring well rose between 3 and 4 feet from September 2003 through February 2004. It cites precipitation data from SeaTac. It would be much more accurate to use data from the weather stations at Landsburg Dam, or even from Redmond Ridge on Novelty Hill. This section notes that "the discharge locations for the water table aquifer have not been positively identified", and again "data is not available to identify the discharge locations for the confined aquifer."

I1-10 Yet without this data, the document infers that the aquifer probably discharges to local streams and wetlands", and describes possible flow paths for groundwater in the aquifer. This section also provides water quality data from the deeper aquifer underneath the City's landfill, then states "a sample was not collected from the water table aquifer; however, its quality should be similar to that of the confined aquifer" (emphasis added). There is no factual basis for this conclusion.

I1-11 Section 4.0 notes that "the exact depth of the fill within the landfill has not been established", yet concludes "the base of the landfill is believed to be above the water table...Previous water quality studies at the landfill are inconclusive on whether the landfill had impacted the ground water". It further adds that ongoing studies may clarify this question at a later date. However, this is the decision document for the Executive to use to choose a discharge alternative. The data should be presented in this document at this time.

I1-12 Section 5.1 provides the technical information on groundwater mounding. It notes that a mound within the gravel would rise between five and thirty feet, then states "gravel thicknesses would likely need to be consistently 15 feet thick or more across an application area for infiltration to be feasible". If the groundwater can mound to thirty feet in thickness, it would seem that the gravel would need to be thirty feet thick to prevent "groundwater

Response to Comment I1-8

Please see Chapter 7, Section 7.1.4.3 of the Final EIS. Several wetlands have been identified through review of wetland inventories and aerial photography. King County Wastewater Treatment Division agrees that wetland inventories and aerial photography have limitations in identifying wetlands. The wetland areas would not be suitable for upland infiltration. If the upland discharge alternative was selected, on-the-ground surveys would be conducted to make sure the infiltration ponds would be sited in a portion of the upland discharge area outside of the wetlands.

Response to Comment I1-9

At the time Technical Memorandum 5A was written, precipitation data for the full period of September through February was not available for the closest official climatological data station run by the National Climatic Data Center (Snoqualmie Falls). The data is now available and the Memorandum has been amended to reflect the new data.

Response to Comment I1-10

King County agrees that inferences were made and a level of uncertainty exists in statements on groundwater flow paths and water quality. However, with the information available, the discharge from the water table aquifer must be to local streams and wetlands and/or to leakage to the confined aquifer. The uncertainty arises from not knowing whether all the wetlands and streams are discharge features or just some and not knowing how much discharges vertically through leakage versus laterally to the surface water features. Discharge pathways from the confined aquifer are less certain because there are no known local surface water features which correspond with the known elevation of the aquifer. However, within the regional setting, there are no other known discharge points than those cited in the technical memorandum. Water quality in the two aquifers should be similar because they both derive water from the same recharge sources – precipitation local to the area. When inferences were made they are based on best available information. Because this level of uncertainty exists, the Final EIS, as prescribed by SEPA, presents a worst case analysis of the upland discharge alternative's potential environmental impacts for the decision-makers to consider when selecting alternatives. Please see Chapter 6 Section 6.2.3.3 for a discussion of the worst case analysis.

Response to Comment I1-11

Please see the response to comment I1-1 for a discussion of the data used to determine the environmental impacts of the upland discharge alternative.

Response to Comment I1-12

Please see the response to comment I1-1 for a discussion of the data used to determine the environmental impacts of the upland discharge alternative. The projected range of mounding (5-30 feet) results from uncertainty in the permeability of the recessional gravels; therefore, it is true that up to 30 feet of gravel may be needed. However, it is likely that less than 30 feet would be needed for more typical permeability values of gravel, particularly since the basin design could be changed to help minimize mounding.

I1-12 flooding" onto the surface. This document does not explain how infiltration basins can work when the ground beneath them is "totally saturated". It does note that "it cannot be determined with existing information whether the six sites proposed for upland disposal have a sufficient thickness of outwash gravel."

Section 5.2 discusses the flow paths of the infiltrated water. It begins with the statement that "the exact flow paths infiltrated water would take from the proposed infiltration location cannot be established with existing information". Due to the mounding of groundwater, this document expects that "water supply wells west and/or northwest of the infiltration site may pump native water mixed, to some degree, with infiltrated water".

Section 5.3 states that the upland disposal option "does have the potential to increase the amounts of certain PPCPs (pharmaceuticals and personal care products) in the ground water; however, the exact nature of any impact cannot be currently addressed due to a lack of PPCP data for both potential discharge water and existing ground water".

Summary

I1-13 The upland disposal alternative should be withdrawn from this Environmental Impact Statement because the necessary evaluations have not been performed and the information has not been included in this document to enable the decision-maker to make an educated decision as to the viability of the upland discharge alternative.

I1-14 The potential water quality risk from infiltrated treated wastewater mixing with the groundwater in water supply wells, including potentially in the water supply for 90% of the City of Carnation, has not been sufficiently investigated and the data is not provided in this document to allow the decision-maker to evaluate the health risk to citizens living downslope of the proposed infiltration basins.

I1-15 Further, wetlands, streams and springs have not been evaluated on the proposed disposal sites. The potential for groundwater contamination from the adjacent City-owned landfill is still being evaluated. Downstream water quantity impacts may include localized flooding from groundwater mounding. The EIS states in numerous places that the site-specific evaluation of the hydrogeology of the upland disposal sites has not been performed, and therefore definitive conclusions cannot be reached regarding the viability of any of these disposal sites.

I1-16 Another option would be to prepare a supplemental EIS once the detailed hydrogeologic studies have been performed on a chosen property. If no suitable site for upland discharge is available, then one of the other disposal alternatives would have to be used, after the County and City have already spent considerable time and money investigating the failed upland discharge alternative. This does not seem like a very efficient use of taxpayer dollars.

Response to Comment I1-13

Please see the response to comment I1-1 for a discussion of the data used to determine the environmental impacts of the upland discharge alternative. This discussion also indicates that due to the uncertainty regarding the geology of the site, King County is presenting a worst-case analysis of the project's environmental impacts at the site for decision-makers' consideration.

Response to Comment I1-14

Please see Chapter 6, Section 6.2.3.3 for a discussion of the groundwater quality impacts. Also, see Chapter 10, Section 10.2.2.3 for a discussion of infiltrated highly treated water mixing with native water in the confined aquifer and environmental health impacts.

Response to Comment I1-15

Please see Chapter 6, Section 6.1.2 for information on existing surface water bodies in the project area. Also, please see Chapter 7, Section 7.1 for a discussion of existing wetlands in the project area. The King County Wastewater Treatment Division agrees that groundwater contamination from the adjacent landfill site is still being evaluated and that localized flooding associated with groundwater mounding could occur.

Response to Comment I1-16

Please see the response to comment I1-1 for a discussion of the data used to determine the environmental impacts of the upland discharge alternative. A supplemental EIS is neither necessary nor appropriate. The Draft EIS was issued at a point in time when a certain level of information was known relating to the probable significant adverse impacts of the proposal and possible ways to mitigate those impacts. Since issuance of the Draft EIS, further analysis has been conducted. In areas where there was uncertainty in one respect or another as to impacts, then following SEPA's guidelines, the EIS presents a worst-case analysis of impacts.

RE: Draft Environmental Impact Statement –
City of Carnation Wastewater Treatment Facility
July 26, 2004
Page 5

Thank you for the opportunity to comment on the Draft Carnation Wastewater Treatment Facility. If you have any questions regarding my comments, please contact us at the phone number, email or address below.

Sincerely,

David and Laura Casey
2441 – 323rd Avenue NE
Carnation, WA 98014
425-333-4199
caseydl@earthlink.net

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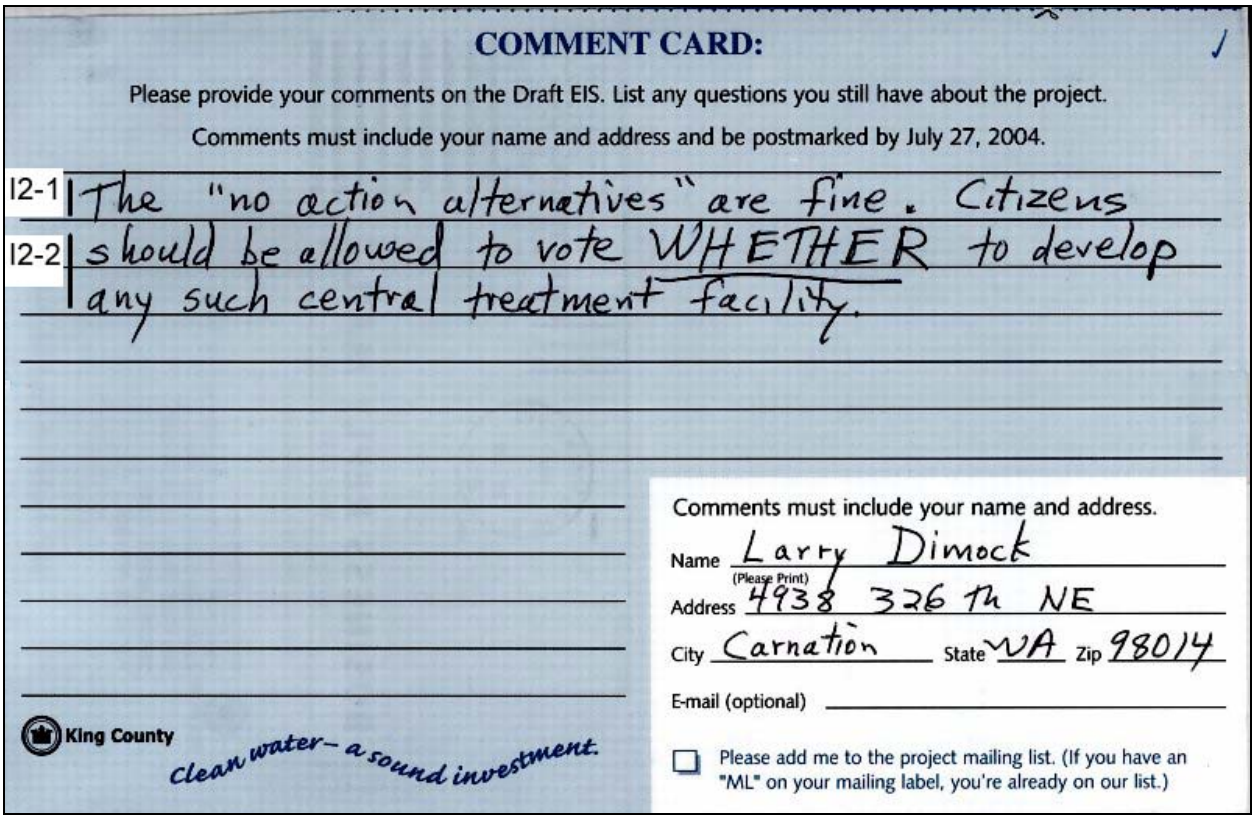


COMMENT CARD:

Please provide your comments on the Draft EIS. List any questions you still have about the project.

Comments must include your name and address and be postmarked by July 27, 2004.

I2-1 The "no action alternatives" are fine. Citizens

I2-2 should be allowed to vote WHETHER to develop any such central treatment facility.

King County

clean water– a sound investment.

Comments must include your name and address.

Name (Please Print) Larry Dimock

Address 4938 326th NE

City Carnation State WA Zip 98014

E-mail (optional)

☐ Please add me to the project mailing list. (If you have an "ML" on your mailing label, you're already on our list.)

Dimock (I2)

Response to Comment I2-1

Thank you for your comment.

Response to Comment I2-2

The process by which the City of Carnation reached the decision to build wastewater treatment facilities is summarized in Chapter 2, Section 2.1, History and Section 2.3, Planning Background.

RECEIVED
JUL 23 2004
ENVIRONMENTAL
PLANNING DIVISION

July 20, 2004

Mark Dinwiddie
3025 Lake Langlois Rd.
Carnation, Wn. 98014
425-333-6729

King County Dept. of Natural Resources
Waste Treatment Division
201 S. Jackson St
Seattle, WN. 98104

Re: Carnation Wastewater Treatment Facility

I3-1 Obviously the best Treatment Plant Site is the one currently owned by the City. Why go out and purchase new property when the City already has what it needs.

I3-2 The location for the discharge should be the Wetlands Discharge area. Why would the City want to waste 10 acres of usable ground when it can discharge into Wetlands? The Wetlands are currently unusable except for wildlife habitat. Discharging into the Wetlands would only enhance the Stillwater Wildlife Area.

If the County/City is honest in its desire to protect and conserve the rural areas and enhance wildlife, then there is very little choice than to go with the City owned property and discharge into Stillwater Wildlife Area.

Sincerely,

Mark Dinwiddie

Dinwiddie (I3)

Response to Comment I3-1

SEPA requires that an EIS discuss reasonable alternatives. For the treatment plant, this EIS meets this requirement by evaluating the potential environmental impacts of constructing and operating the plant at two alternative sites. Decision makers will take the environmental impacts at the two sites into account along with non-environmental factors such as cost and community impacts in choosing a treatment plant site.

Response to Comment I3-2

As indicated in the response to comment I3-1, SEPA requires that an EIS discuss reasonable alternatives. The wetland, river and upland discharge alternatives are reasonable alternatives for the discharge facility. Decision makers will take the environmental impacts of these alternatives into account along with non-environmental factors such as cost and community impacts in choosing a discharge facility.

-----Original Message-----
From: lhouk@issaquah-bank.com [mailto:lhouk@issaquah-bank.com]
Sent: Thursday, July 01, 2004 3:52 PM
To: website.wtd@metrokc.gov
Cc: james.foulk@metrokc.gov; courtney.hudak@metrokc.gov
Subject: EIS for proposed Carnation Wastewater Treatment Plant

On "07/01/2004" at "03:52PM": A customer comment from Larry Houk was posted from the King County webpage http://dnr.metrokc.gov/wtd/carnation/EIS/comment.htm and mailed to website.wtd@metrokc.gov

Subject: EIS for proposed Carnation Wastewater Treatment Plant
Comment Type: Question
Email Address: lhouk@issaquah-bank.com

Please log this comment for the aformentioned project on behalf of Larry Houk 4138 327th Circle NE Carntion Washington. (1) The monthly fee for the Sewer service is excessive, two to three times above the average rates in King County. This will burden the budgets of the average home owner in Carnation. How is this being address? Is a $25,000,000 treatment plant the only answer.

I4-1

An email response has been requested.

Houck (I4)

Response to Comment I4-1

SEPA does not require an EIS to consider the cost of a proposal. Cost and other non-environmental factors will be taken into account by decision makers along with the environmental factors discussed in the EIS in choosing treatment facility alternatives.

Please contact the City of Carnation for information on how costs to homeowners are being addressed.

In Chapter 3, Section 3.4, the EIS provides a summary of other alternatives that were considered.

COMMENT CARD:

Please provide your comments on the Draft EIS. List any questions you still have about the project.

Comments must include your name and address and be postmarked by July 27, 2004.

I believe the Weck Weath Treatment plant site is A poor choice. If built there it would be located right next to Tolt Middle School. For odor & health reasons, this would A poor choice.

I16-1

King County

clean water– a sound investment.

Comments must include your name and address.

Name LONNIE P. HUGHES (Please Print)

Address 4007-325TH AVE N.E.

City CARNATION State WA Zip 98014

E-mail (optional) _____

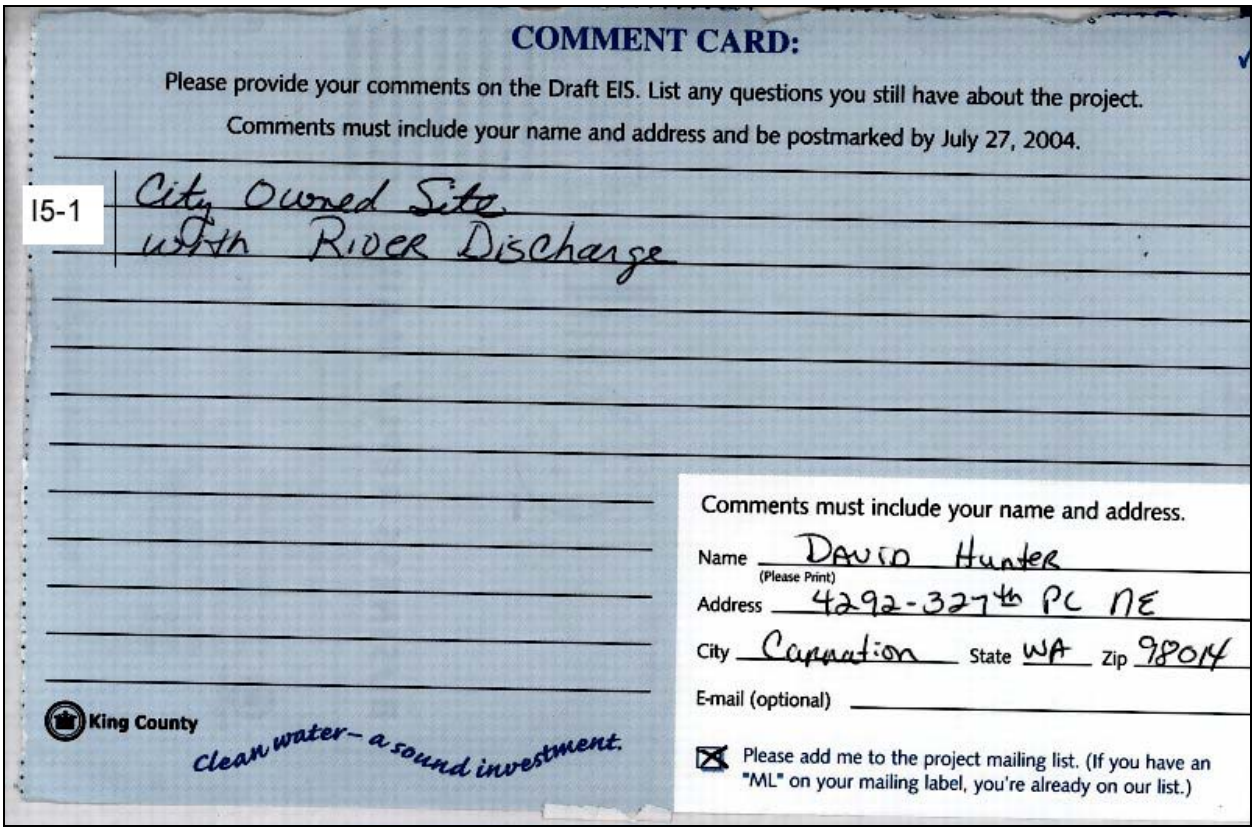
☐ Please add me to the project mailing list. (If you have an "ML" on your mailing label, you're already on our list.)

Hughes (I16)

Response to Comment I16-1

Please see the response to comment Dinwiddie, I3-1.

If the Weckwerth site were chosen for the plant, King County would implement appropriate mitigation measures, such as those discussed in the EIS, to minimize impacts on the school. Please see the responses to the Riverview School District comments for more detail.



COMMENT CARD:

Please provide your comments on the Draft EIS. List any questions you still have about the project.

Comments must include your name and address and be postmarked by July 27, 2004.

I5-1 City Owned Site with River Discharge

King County

clean water– a sound investment.

Comments must include your name and address.

Name David Hunter (Please Print)

Address 4292-327th PL NE

City Carnation State WA Zip 98014

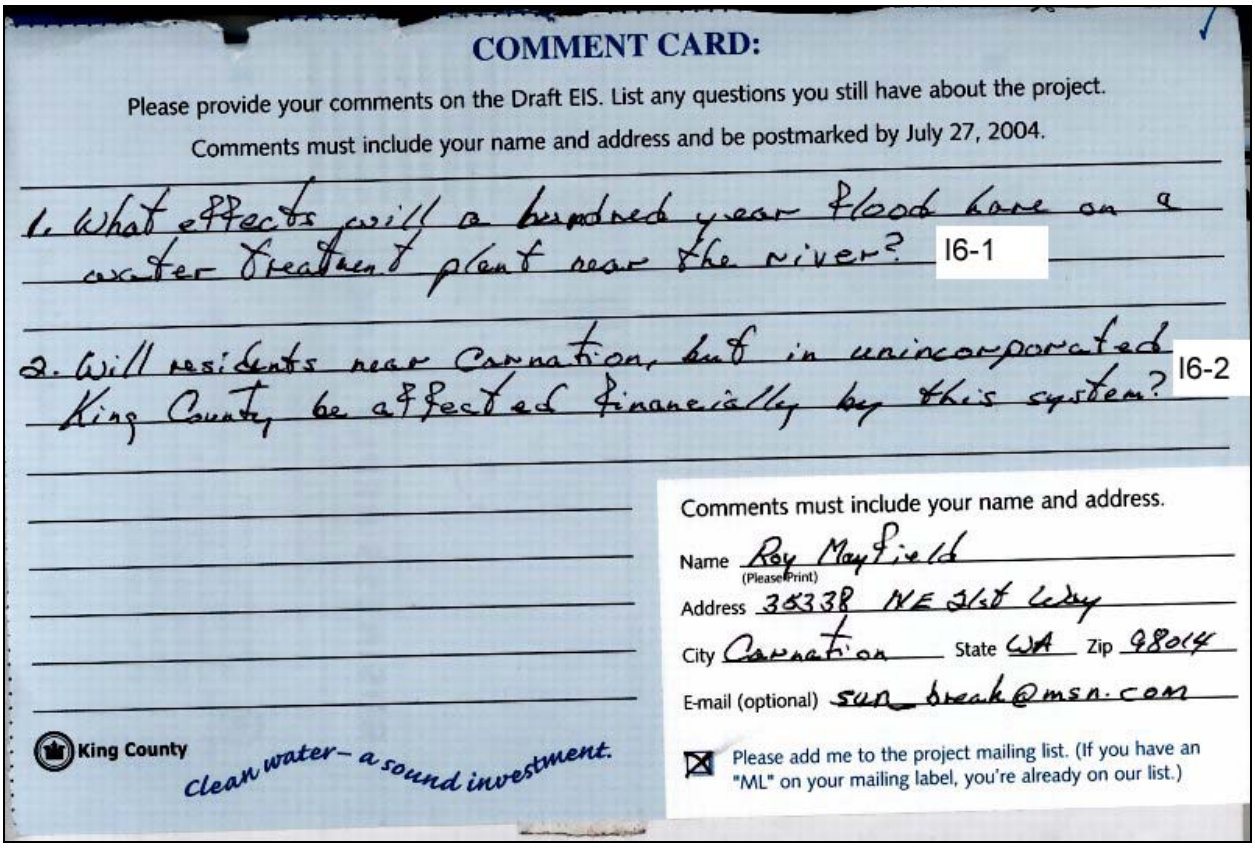
E-mail (optional)

☒ Please add me to the project mailing list. (If you have an "ML" on your mailing label, you're already on our list.)

Hunter (I5)

Response to Comment I5-1

Thank you for your comment.



COMMENT CARD:

Please provide your comments on the Draft EIS. List any questions you still have about the project.

Comments must include your name and address and be postmarked by July 27, 2004.

1. What effects will a hundred year flood have on a water treatment plant near the river? I6-1

2. Will residents near Carnation, but in unincorporated King County, be affected financially by this system? I6-2

Comments must include your name and address.

Name Roy Mayfield (Please Print)

Address 33338 NE 31st Way

City Carnation State WA Zip 98014

E-mail (optional) sun_break@msn.com

☒ Please add me to the project mailing list. (If you have an "ML" on your mailing label, you're already on our list.)

King County

clean water– a sound investment.

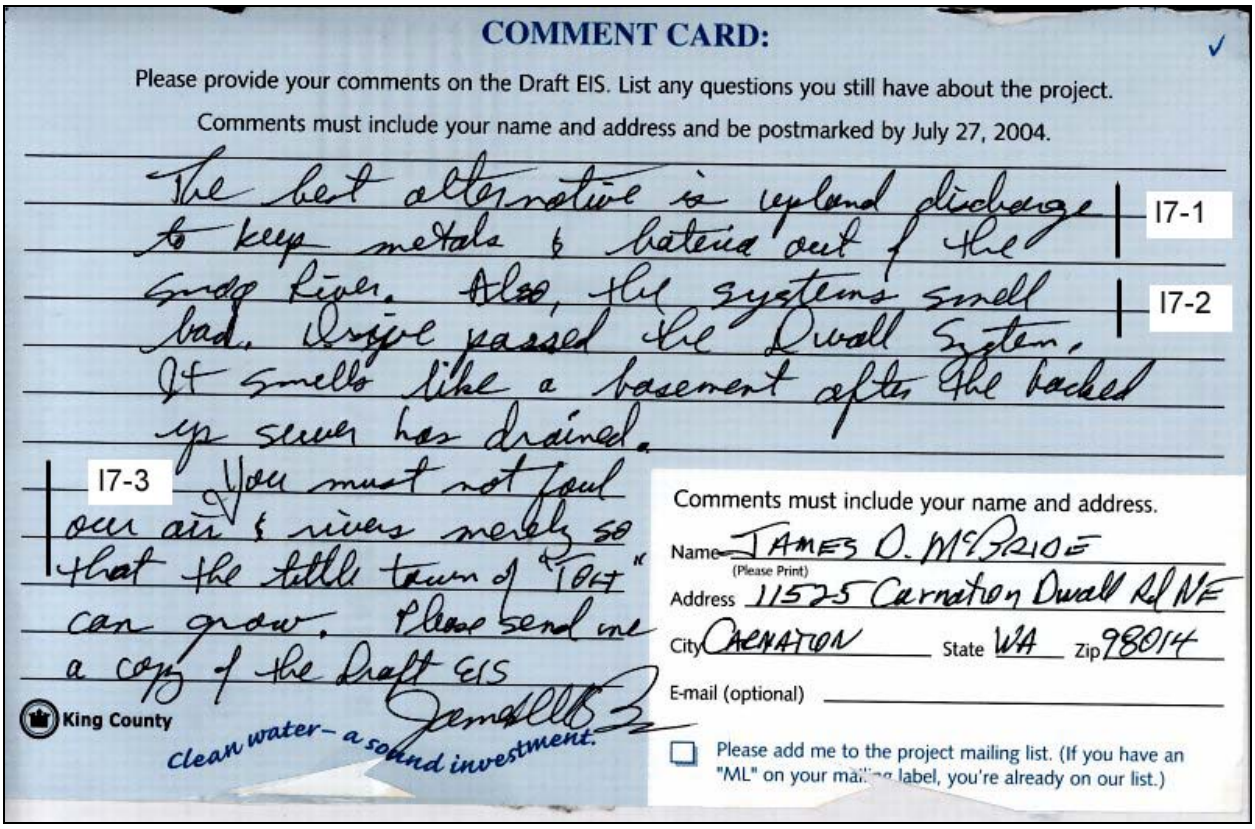
Mayfield (I6)

Response to Comment I6-1

Please see Chapter 6, Section 6.2.2 of the Final EIS for a discussion of the potential flood impacts and mitigation measures associated with the treatment plant.

Response to Comment I6-2

The only residents of unincorporated King County who might be affected financially would be those living outside the current city limits but inside Carnation's designated urban growth area (see EIS Figure 1-2). If in the future Carnation annexed this area and extended the sewer collection system there, area residents who connected to the system would have to pay to use it.



COMMENT CARD: ✓

Please provide your comments on the Draft EIS. List any questions you still have about the project.

Comments must include your name and address and be postmarked by July 27, 2004.

The best alternative is upland discharge to keep metals & bateria out of the Snoq River. Also, the systems smell bad. Driving passed the Duvall System, it smells like a basement after the backed up sewer has drained. I7-1 I7-2

I7-3 You must not foul our air & rivers merely so that the little town of "Toy" can grow. Please send me a copy of the Draft EIS

Comments must include your name and address.

Name JAMES O. McBRIDE (Please Print)

Address 11525 Carnation Duvall Rd NE

City CARNATION State WA Zip 98014

E-mail (optional) _____

☐ Please add me to the project mailing list. (If you have an "ML" on your mailing label, you're already on our list.)

King County

Clean water– a sound investment.

McBride (I7)

Response to Comment I7-1

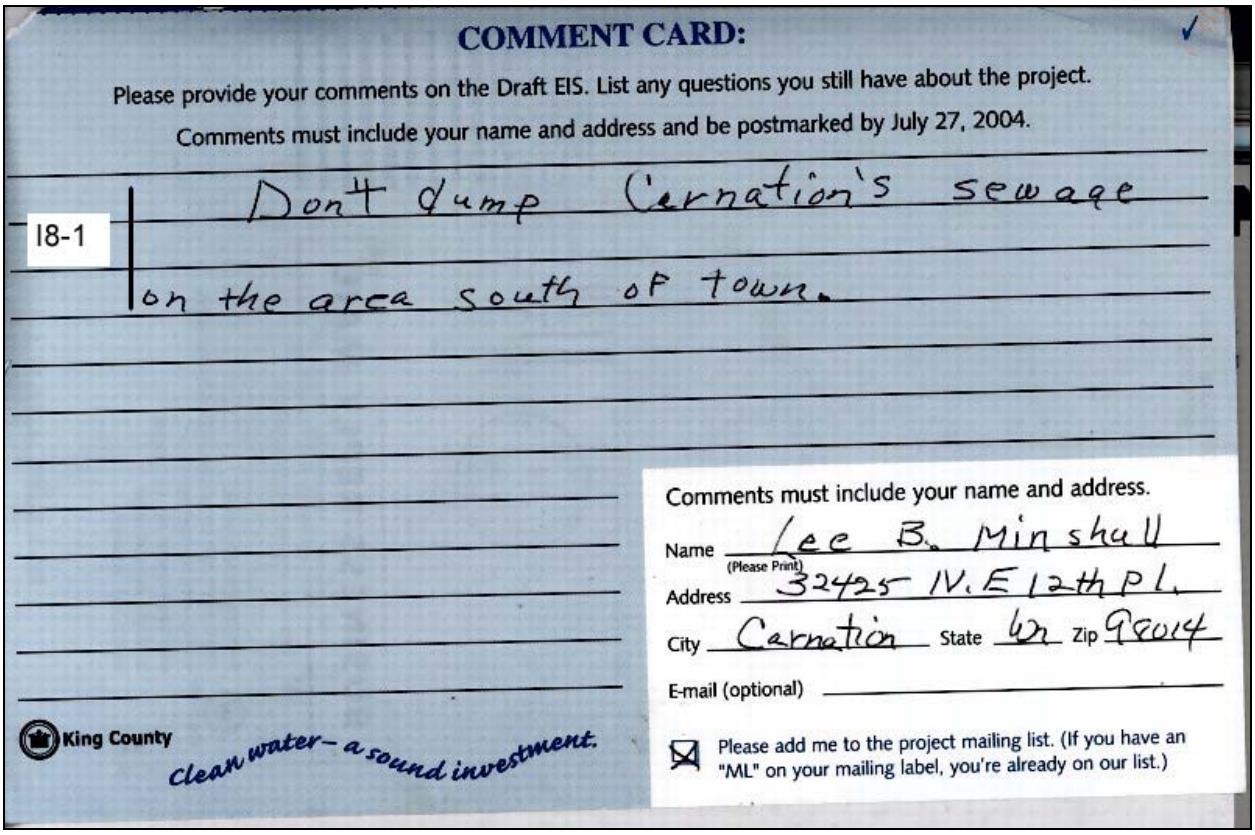
Chapter 3, Table 3-3 compares the potential environmental impacts of discharging highly treated water to the river, wetlands or upland. Chapter 6, Section 6.2.3 provides a detailed discussion of these impacts.

Response to Comment I7-2

In Chapter 5, Section 5.2.1.2, the EIS states that, "Minimal odor impacts to the surrounding properties are expected during operation of the treatment plant with implementation of the odor-control measures discussed in the section titled Mitigation Measures Common to All Treatment Facilities." The referenced mitigation measures are listed in Section 5.2.1.3.

Response to Comment I7-3

As indicated in the response to the previous comment, minimal odor impacts are expected from the treatment facility. Also, as discussed in Chapter 6 of the EIS, the treatment facility is not expected to cause any significant adverse impacts to ambient water quality. Chapter 1, Section 1.2 discusses the purpose and need for the project.



COMMENT CARD: ✓

Please provide your comments on the Draft EIS. List any questions you still have about the project.

Comments must include your name and address and be postmarked by July 27, 2004.

I8-1 Don't dump Carnation's sewage on the area south of town.

King County

clean water– a sound investment.

Comments must include your name and address.

Name Lee B. Minshall (Please Print)

Address 32425 IV. E 12th Pl.

City Carnation State Wa Zip 98014

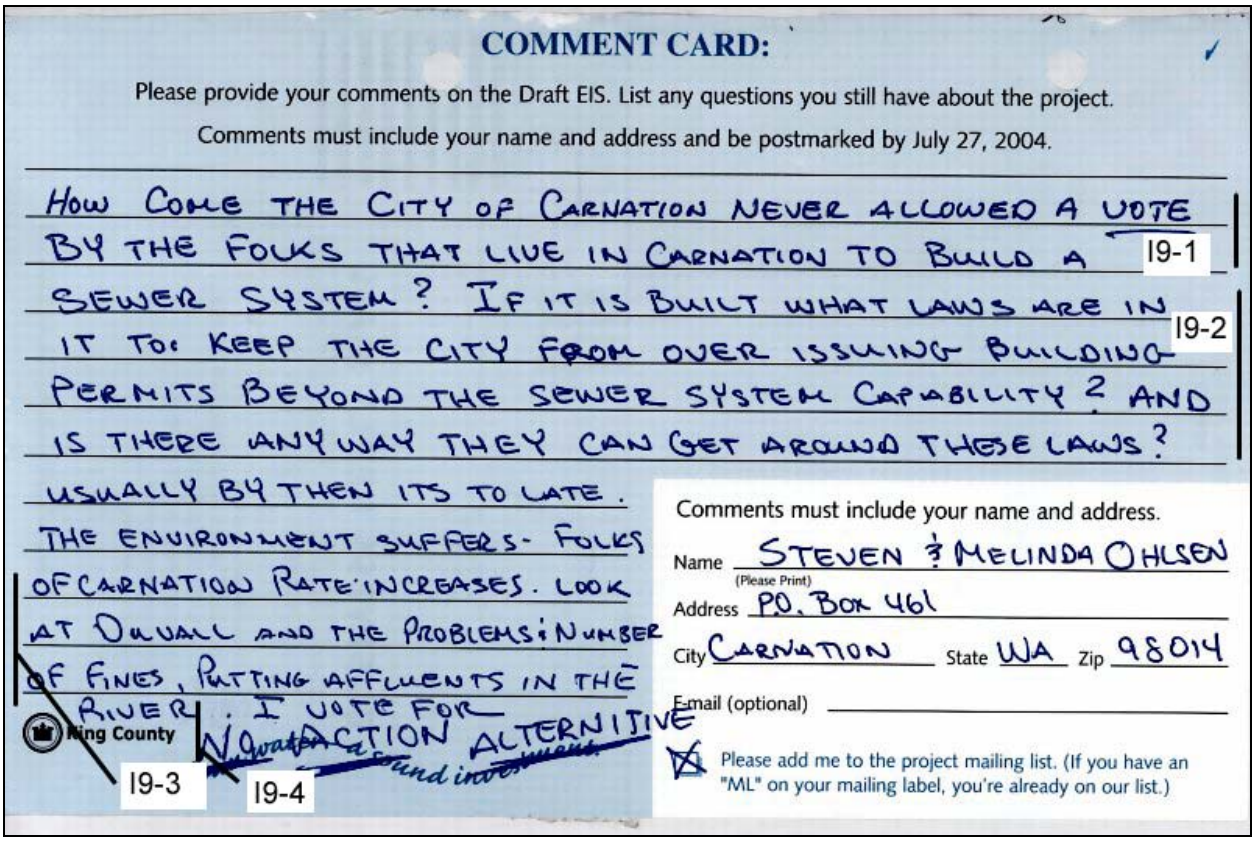
E-mail (optional)

☒ Please add me to the project mailing list. (If you have an "ML" on your mailing label, you're already on our list.)

Minshall (I8)

Response to Comment I8-1

Thank you for your comment.



COMMENT CARD:

Please provide your comments on the Draft EIS. List any questions you still have about the project.

Comments must include your name and address and be postmarked by July 27, 2004.

HOW COME THE CITY OF CARNATION NEVER ALLOWED A VOTE BY THE FOLKS THAT LIVE IN CARNATION TO BUILD A SEWER SYSTEM? IF IT IS BUILT WHAT LAWS ARE IN IT TO: KEEP THE CITY FROM OVER ISSUING BUILDING PERMITS BEYOND THE SEWER SYSTEM CAPABILITY? AND IS THERE ANY WAY THEY CAN GET AROUND THESE LAWS? I9-1 I9-2

USUALLY BY THEN ITS TO LATE. THE ENVIRONMENT SUFFERS- FOLKS OF CARNATION RATE INCREASES. LOOK AT DUVALL AND THE PROBLEMS: NUMBER OF FINES, PUTTING AFFLUENTS IN THE RIVER. I VOTE FOR NO ACTION ALTERNITIVE

King County

I9-3 I9-4

Comments must include your name and address.

Name STEVEN & MELINDA OHLSEN (Please Print)

Address P.O. BOX 461

City CARNATION State WA Zip 98014

E-mail (optional) _____

☒ Please add me to the project mailing list. (If you have an "ML" on your mailing label, you're already on our list.)

Ohlsen (I9)

Response to Comment I9-1

The process by which the City of Carnation reached the decision to build wastewater treatment facilities is summarized in Chapter 2, Section 2.1, History and Section 2.3, Planning Background.

Response to Comment I9-2

King County and the City of Carnation have entered into an agreement for sewage disposal. Based on this agreement King County is obligated to accept and treat all sewage the city delivers to the plant. If sewage volumes someday approach the capacity of the plant, King County will be obligated to construct additional capacity.

The most important element to ensuring that building permits and connections to the sewer system do not exceed the capacity is planning. During the wastewater treatment plant planning process current population projections, buildable lands data, land use zoning, and other information are used to design a wastewater facility to accommodate the current and future population of Carnation. King County is sizing the Wastewater Treatment Facility to accommodate City of Carnation wastewater flows through 2050. Several documents provide detailed population and wastewater flow projections including the City of Carnation Comprehensive Sewer Plan and City of Carnation Comprehensive Land Use Plan. For further information on sizing of the wastewater treatment facility please see Technical Memorandum No. 2 Population, Flow, and Loads published with the EIS.

The wastewater treatment plant will operate under a National Pollutant Discharge Elimination System (NPDES) Permit issued by the Department of Ecology. The NPDES permit will contain design criteria including capacity of the plant. In addition the permit will contain requirements that King County plan to maintain capacity. This requires King County to submit a plan to the Department of Ecology when the design capacity reaches 85 percent for three consecutive months or when the projected increases would reach design capacity within five years whichever comes first.

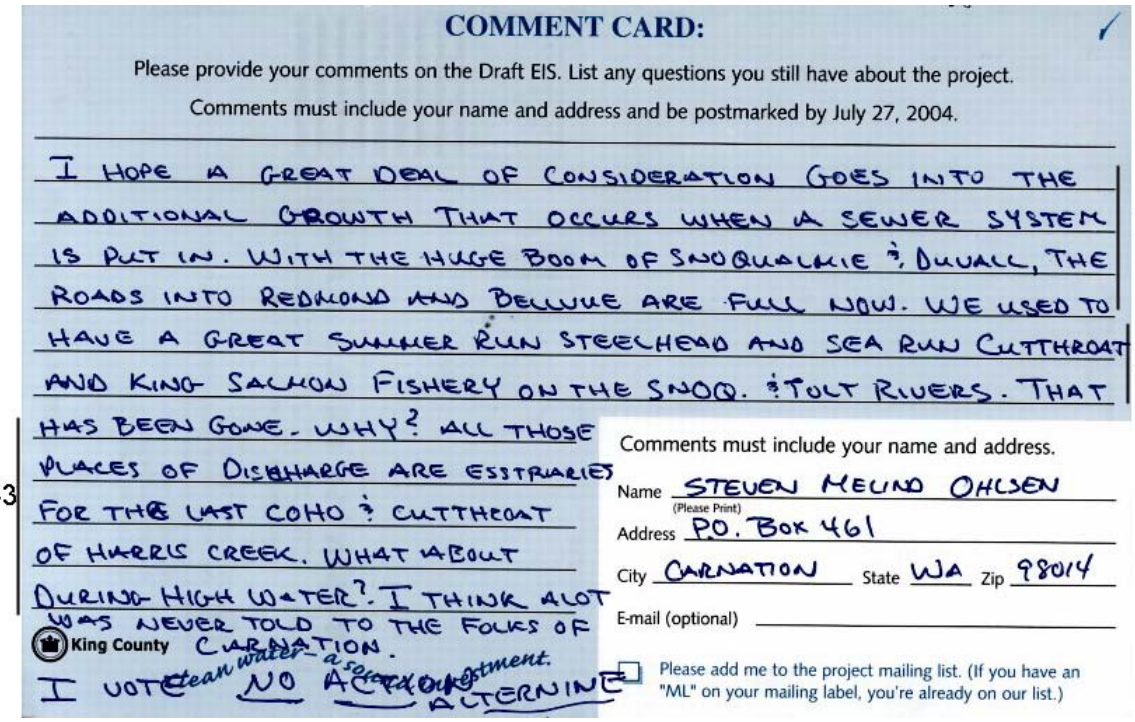
In an extreme case the Department of Ecology has the authority to determine that a moratorium on connections to the wastewater treatment plant is necessary.

Response to Comment I9-3

King County Wastewater Treatment Division is aware that Duvall has experienced problems with discharge permit limits for silver, zinc, copper, and mercury. To address these and other issues, Duvall is currently upgrading its treatment plant and has selected the Membrane Bioreactor (MBR) technology. These types of problems are not anticipated in Carnation for the following reasons. The Membrane Bioreactor (MBR) technology that would be used is one of the best available technologies for treating municipal wastewater. In the unforeseen event that additional metals removal is required to meet permit limits, the treatment plant would also have chemical addition capabilities that would enable enhanced metals removal.

Response to Comment I9-4

Thank you for your comment.



COMMENT CARD:

Please provide your comments on the Draft EIS. List any questions you still have about the project.

Comments must include your name and address and be postmarked by July 27, 2004.

I HOPE A GREAT DEAL OF CONSIDERATION GOES INTO THE ADDITIONAL GROWTH THAT OCCURS WHEN A SEWER SYSTEM IS PUT IN. WITH THE HUGE BOOM OF SNOQUALMIE, DUVALL, THE ROADS INTO REDMOND AND BELLVUE ARE FULL NOW. WE USED TO HAVE A GREAT SUMMER RUN STEELHEAD AND SEA RUN CUTTHROAT AND KING SALMON FISHERY ON THE SNOQ. TOLT RIVERS. THAT HAS BEEN GONE. WHY? ALL THOSE PLACES OF DISCHARGE ARE ESSTRIARIES FOR THE LAST COHO & CUTTHROAT OF HARRIS CREEK. WHAT ABOUT DURING HIGH WATER? I THINK ALOT WAS NEVER TOLD TO THE FOLKS OF CARNATION. I VOTE clean water a sewer treatment. NO ACTION ALTERNINE

King County

Comments must include your name and address.

Name STEVEN MELIND OHLSEN (Please Print)

Address P.O. BOX 461

City CARNATION State WA Zip 98014

E-mail (optional)

Please add me to the project mailing list. (If you have an "ML" on your mailing label, you're already on our list.)

I10-1

I10-2

I10-3

Ohlsen (I10)

Response to Comment I10-1

The EIS addresses the impacts of new growth in the section titled "Cumulative Impacts" at the end of each impact chapter. The proposal for a treatment facility is consistent with the City of Carnation Comprehensive Plan and other planning documents. These planning documents take many elements of the environment into account including transportation planning to effectively manage population changes over time. Also, the wastewater treatment facility is being planned and designed to serve the current and future population within the City of Carnation and its annexation area. The population projections for Carnation have been developed as part of a regional planning process. These projections are used in transportation planning to expand current roads and build new roads where needed.

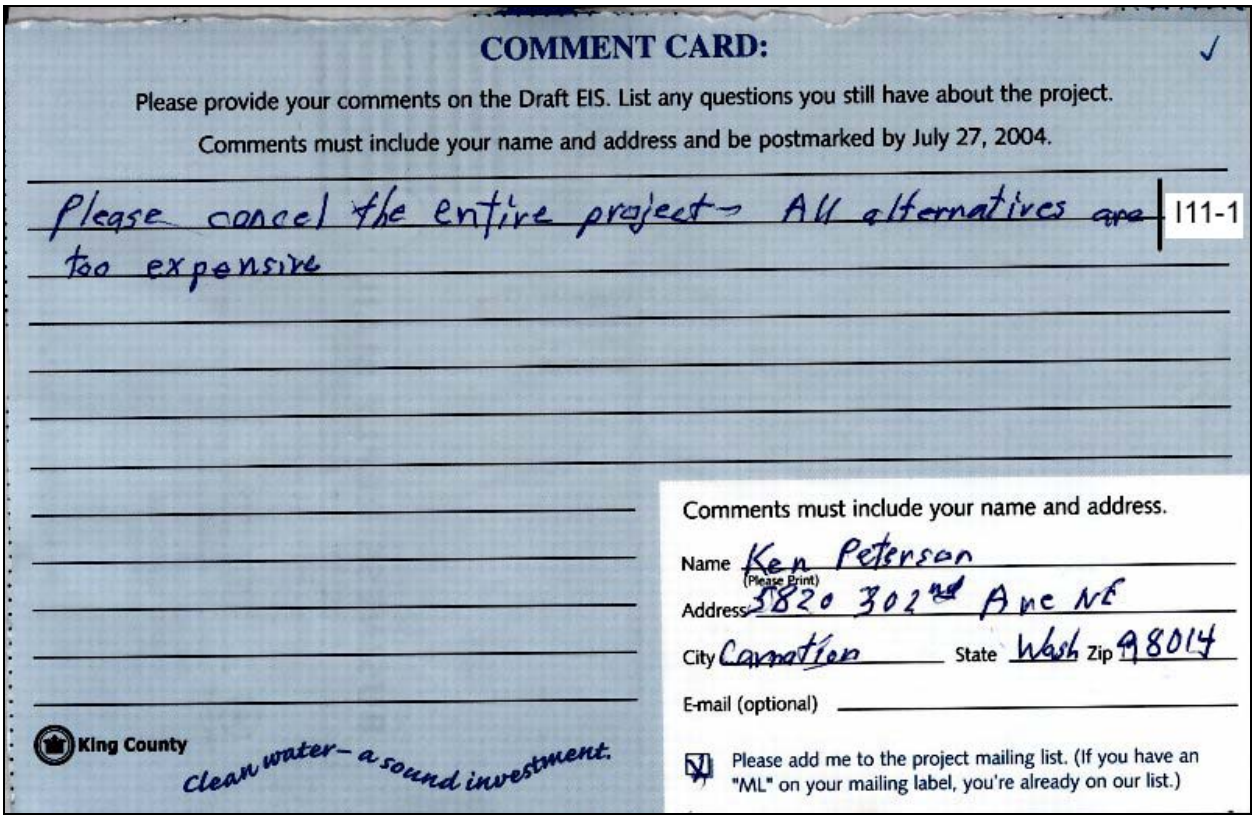
Response to Comment I10-2

Information on status of fisheries in the Snoqualmie and Tolt Rivers are available from the Washington Department of Fish and Wildlife. Available reports suggest the Snoqualmie River Watershed contains some of the healthiest habitat remaining in King County and supports wild populations of coho, chinook, chum and pink salmon, as well as, steelhead, cuttthroat, rainbow and bull trout (King County WLR, 2001). The Draft EIS reported that all of the above salmonid species are known to be present in the Snoqualmie and Tolt Rivers adjacent to Carnation. Specific reasons for the decline in any of the salmonid species populations in the watershed are not immediately available. Generally, the decline is likely a combination of numerous factors including low ocean productivity, overharvest, interactions with less-fit hatchery fish, loss and degradation of habitat due to physical modifications in and along the river and upland land development (residential, commercial, agricultural and forestry related). The latter also increases stormwater runoff associated with development. Stormwater runoff can reduce water quality (more fine sediments and contaminants) and cause stream flows to more quickly increase, leading to increased flooding and erosion impacts to aquatic organisms, including salmon.

King County Department of Natural Resources and Parks, Water and Land Resources Division. 2001. Salmon Conservation in the Snoqualmie Watershed—Snoqualmie Watershed Forum Strategy and Work Plan 2001. Prepared in cooperation with the City of Carnation, City of Duvall, City of North Bend, and City of Snoqualmie.

Response to Comment I10-3

Chapter 7 of the Draft and Final EIS discusses known current fish use of Harris Creek. No water discharged at the wetland discharge would reach Harris Creek via surface water flow. It is possible, although unlikely, some of the water discharged could reach Harris Creek via groundwater flow. Safeguards will be designed in the treatment process to monitor discharged water and protect aquatic species at the wetland discharge site.



COMMENT CARD: ✓

Please provide your comments on the Draft EIS. List any questions you still have about the project.

Comments must include your name and address and be postmarked by July 27, 2004.

Please cancel the entire project - All alternatives are too expensive I11-1

King County

clean water – a sound investment.

Comments must include your name and address.

Name Ken Peterson (Please Print)

Address 3820 302nd Ave NE

City Carnation State Wash Zip 98014

E-mail (optional)

☒ Please add me to the project mailing list. (If you have an "ML" on your mailing label, you're already on our list.)

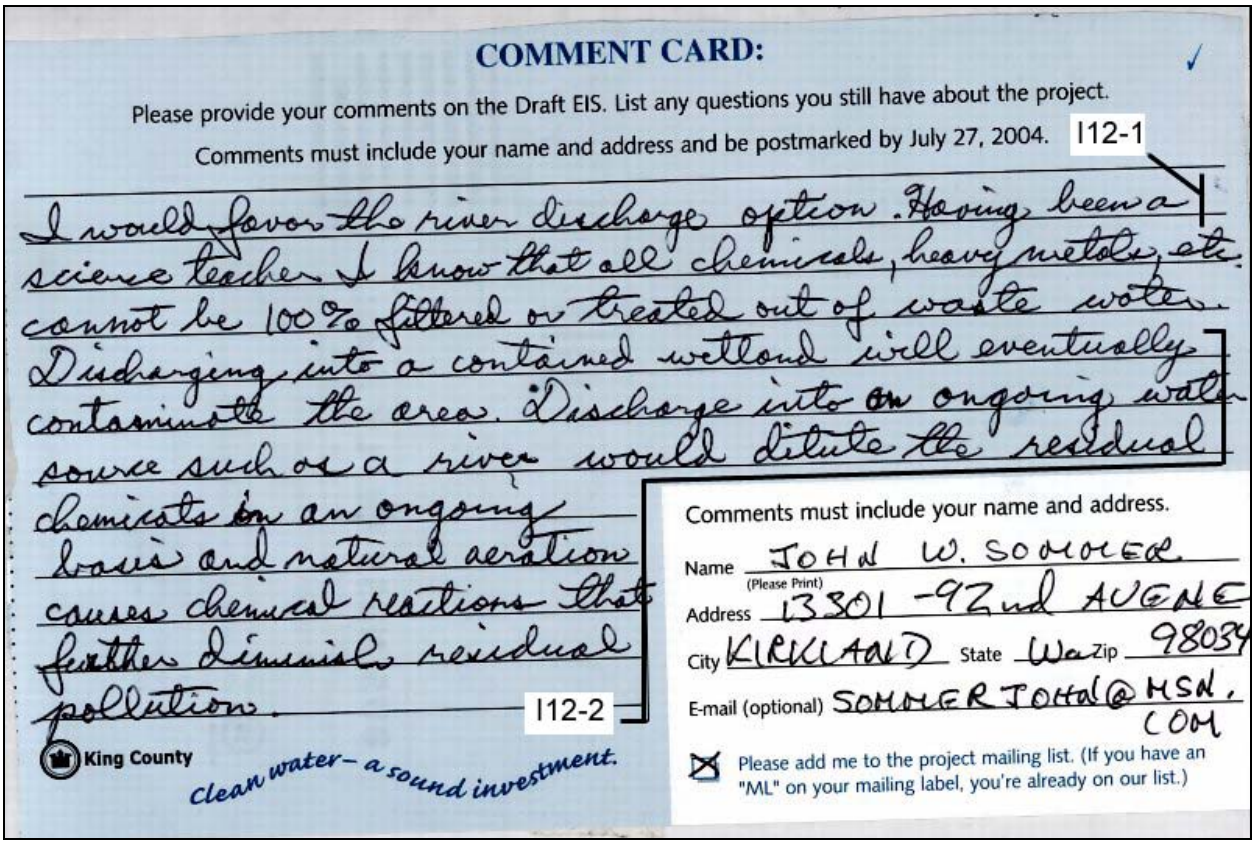
Peterson (I11)

Response to Comment I11-1

SEPA does not require an EIS to consider the cost of a proposal. Cost and other non-environmental factors will be taken into account by decision makers along with the environmental factors discussed in the EIS in choosing treatment facility alternatives.

Please contact the City of Carnation for information on how costs to homeowners are being addressed.

In Chapter 3, Section 3.4, the EIS provides a summary of other alternatives that were considered.



COMMENT CARD:

Please provide your comments on the Draft EIS. List any questions you still have about the project.

Comments must include your name and address and be postmarked by July 27, 2004.

I12-1

I would favor the river discharge option. Having been a science teacher I know that all chemicals, heavy metals, etc. cannot be 100% filtered or treated out of waste water. Discharging into a contained wetland will eventually contaminate the area. Discharge into an ongoing water source such as a river would dilute the residual chemicals in an ongoing basis and natural aeration causes chemical reactions that further diminish residual pollution.

I12-2

King County

clean water– a sound investment.

Comments must include your name and address.

Name JOHN W. SOMMER (Please Print)

Address 13301 -92nd AVENUE

City KIRKLAND State WA Zip 98034

E-mail (optional) SOMMERJOHN@MSN.COM

☒ Please add me to the project mailing list. (If you have an "ML" on your mailing label, you're already on our list.)

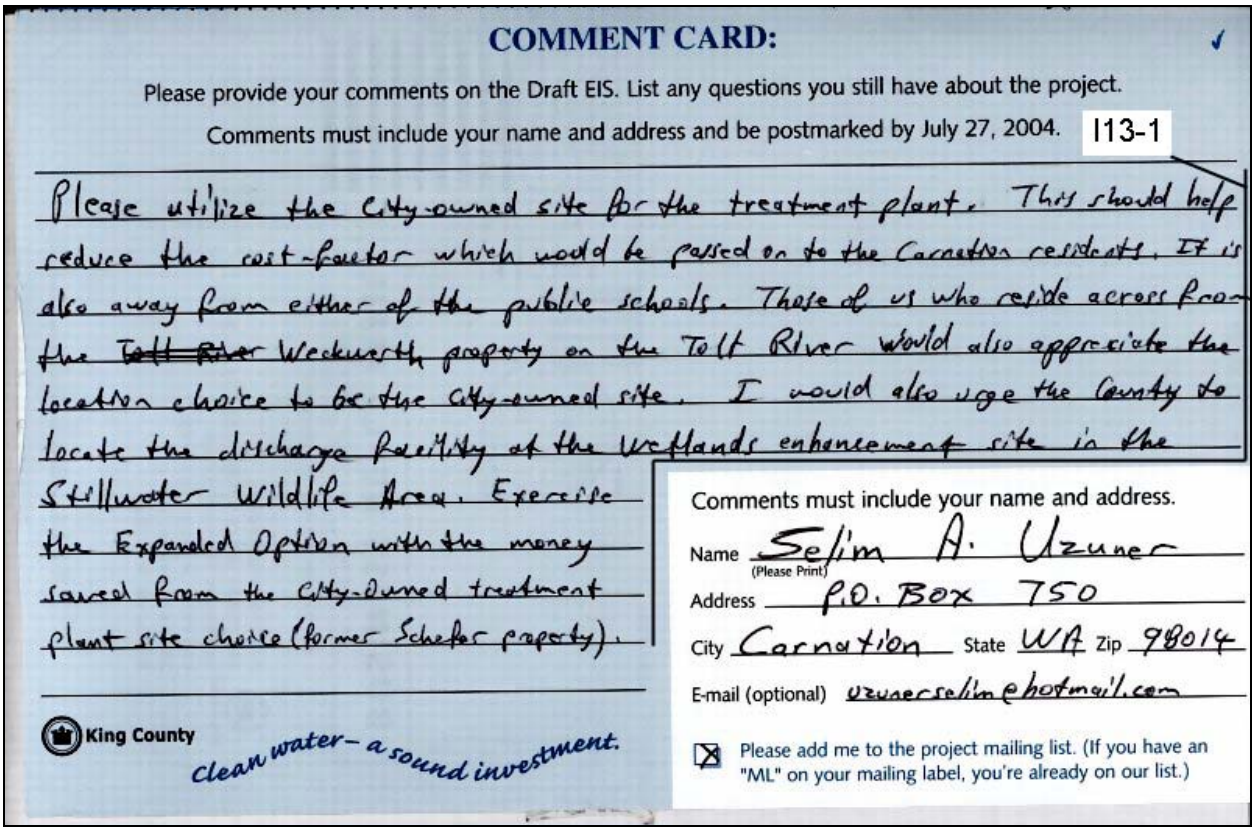
Sommer (I12)

Response to Comment I12-1

As stated in the Draft EIS, the King County Wastewater Treatment Division has selected membrane bioreactors (MBRs) as the treatment technology for the proposed Carnation Wastewater Treatment Facility. MBR technology produces highly treated water. Please see Chapter 6, Table 6-2 for information on the amount of pollutant removal during the wastewater treatment process. Any discharge alternative selected would be required to meet a variety of permit conditions including the National Pollutant Discharge Elimination System (NPDES). Permits requirements would be placed on the quantity and concentration of pollutants in the highly treated water. These requirements are developed to protect public health and safety as well as preserve the beneficial uses of water bodies for people and wildlife.

Response to Comment I12-2

King County Wastewater Treatment Division agrees that the discharging to the river provides a larger column of water and greater dilution of highly treated water than in the wetland. The wetland differs from the river in that further removal of pollutants could occur through natural physical and biological process. Both the river and wetland have potential pollutant removal advantages. For these and other reasons no significant impacts to water quality are expected from either discharge alternative. Please see Chapter 6, Section 6.2.3 for a discussion of the water quality impacts of discharge to both the river and wetland.



COMMENT CARD:

Please provide your comments on the Draft EIS. List any questions you still have about the project.

Comments must include your name and address and be postmarked by July 27, 2004. I13-1

Please utilize the City-owned site for the treatment plant. This should help reduce the cost-factor which would be passed on to the Carnation residents. It is also away from either of the public schools. Those of us who reside across from the ~~Tolt River~~ Weckworth property on the Tolt River would also appreciate the location choice to be the City-owned site. I would also urge the County to locate the discharge facility at the Wetlands enhancement site in the Stillwater Wildlife Area. Exercise the Expanded Option with the money saved from the City-owned treatment plant site choice (former Schafer property).

King County

Clean water– a sound investment.

Comments must include your name and address.

Name Selim A. Uzuner (Please Print)

Address P.O. Box 750

City Carnation State WA Zip 98014

E-mail (optional) uzunerselim@hotmail.com

☒ Please add me to the project mailing list. (If you have an "ML" on your mailing label, you're already on our list.)

Uzuner (I13)

Response to Comment I13-1

Please refer to the response to comments Washington State Department of Natural Resources, S2-2 and Dinwiddie, I3-1 for a discussion of the decision process that will be used to select alternatives considered in this EIS.

From: Paul Webber[SMTP:JPWEBBER@ATTBI.COM]
Sent: Monday, July 26, 2004 10:50:04 PM
To: CarnationWWTP@metrokc.gov
Subject: Comments on Draft EIS

I will begin my comments by saying I have never read and EIS with more assumptions, likelihood's and conjecture.

I14-1 In section 4.1.4 A hazardous seismic area is stated for the River and Wetland discharge options, but not for the Upland infiltration option. How can that be when they are all three located in the same geologic area and crossing the Tolt river would add additional seismic hazards. Does County Critical Areas Ordinances cover the construction of the proposed pipelines for all three alternative discharge scenarios? To what extent will the pipeline be seismically protected?

I14-2 4.1.4.3 Upland discharge doesn't have a seismic rating?

I14-3 Also this section makes the analogy based on an assumption that the soil conditions are the same at the City landfill site as for the upland discharge sites? Is this a valid assumption?

I14-4 4.2.5 No action alternative says seismic events could cause failure of on site septic systems, what are the risks to treatment plant and collection system from seismic events?

I14-5 6.1.4 Existing groundwater resources. This section says no site specific explorations have been conducted for the proposed plant locations, but states that higher water table is "likely" the result of increased rain. This is sound science on which to write an EIS?In discussing the geology of the Stillwater site, the draft presumes the deposits "are underlain by more permeable fluvial deposits".and that surface water "does not likely reach ground water" and upward transfer is "unlikely".

I14-6 In the discussion of the upland discharge area the "discharge locations for the shallow aquifer have not been positively identified " and it "is believed that much of the water infiltrates downward to a confined aquifer" Is this sound science to make such assumptions? Continuing in this section "it appears there is only one house in the

I14-7 discharge area itself", and it goes on to say "there is likely only one water supply well in the discharge area". Again we are assuming and not presenting factual data to support the EIS. Finally the EIS says "downward seepage does

I14-8 ultimately move water into the lower confined aquifer" where a water well would be located. What impact on that well? Conjecture seems to be the rational rather than facts.

6.2.3.3 Impacts of upland discharge

I14-9 No site specific data is presented because "access to the upland ..study area was limited". So the EIS assumes the City owned landfill site is the same soil and groundwater conditions as the upland area.There is no science to support the presumption and "site-specific investigations would be conducted to ensure suitability ", this is after the fact investigating and certainly not factual enough for the County Executive to make a decision.

I14-10 In discussing groundwater mounding, there is a conflict between section 4.1.4.3 "The site is suitable for infiltration" and 6.2.3.3 "This would raise the water table to the surface and could cause localized flooding" continuing it is stated " additional site-specific investigation would be required to determine if soils would have sufficient thickness of material(gravel) to support infiltration and this disposal option (Carollo,2004)" Which is it? 4.1.4.3 or 6.2.3.3???

I14-11 Again in the last paragraph " If upland discharge is determined to be feasible" , is this the basis for writing an alternative? when you state you don't even know if it is feasible?

6.2.5 No action alternative

I14-12 "Risk to surface and groundwater quality would continue... as aging systems continue to fail" What would be the problem of repairing these failed systems with one of the County approved systems?

I14-13 The PHSKC letter states "Since this 1987 declaration little has changed in regards to the disposal-only systems and their potential to contaminate ground water". Did the PHSKC survey Carnation to see if their statement is factual? Did they review applications for repair or replacement of existing septic systems in Carnation? Has PHSKC ever documented in Carnation a contamination of surface or groundwater from septic systems? Has any illness been factually documented in Carnation from contaminated ground water? Has it been confirmed by testing? Would it not be a cost effective method to repair existing disposal-only systems with County approved mound or traditional septic systems?

Thank you for the opportunity to comment on this EIS.
Paul Webber
14418 NE 64th St.
Redmond, Wa 98053

Webber (I14)

Response to Comment I14-1

It is agreed that all three discharge alternatives are located in the same geologic setting. The seismic hazard area identified on Figure 4-1 is from the King County Sensitive Areas Ordinance (SAO). The SAO defines seismic hazard areas as "those areas in King County subject to severe risk of earthquake damage as a result of soil liquefaction in areas underlain by cohesionless soils of low density and usually in association with a shallow groundwater table or of other seismically induced settlement (KCC 21A.06.1045)." As this definition indicates, the specific seismic hazard being mapped and regulated is soil liquefaction. This definition does not consider other seismic hazards such as ground shaking and landslides. Generally, the soils on the Snoqualmie Valley floor adjacent to the river have properties that indicate that liquefaction during an earthquake is a risk. Therefore, those areas are mapped as seismic hazard areas. Soils at higher elevations in the Snoqualmie Valley do not have the properties that indicate that liquefaction is a risk. The river and wetland discharge options are located on the Snoqualmie Valley floor at or adjacent to the river and therefore in mapped seismic hazard areas. The upland discharge alternative is at a higher elevation in the Snoqualmie Valley and is not mapped as a seismic hazard area.

As described in Chapter 9, Section 9.1.1, construction of any of the project facilities in sensitive areas of unincorporated King County would be subject to regulation under the King County Sensitive Areas Code.

Chapter 4, Section 4.2.1.3 describes the design standards that the pipelines would have to meet to withstand the level of earthquake hazard anticipated for the project area.

Response to Comment I14-2

Chapter 4, Section 4.2.1.2 describes the seismic site classes for all project sites. These site classes are from the International Building Code.

Response to Comment I14-3

Section 3.2 of Technical Memorandum 5A discusses the soil conditions at the City's landfill site and how they compare to the soils of the upland disposal study area. Based on available information, it is very likely that the soils are the same in the study area parcels as at the landfill site.

Response to Comment I14-4

Section 4.2.1.2 describes the seismic risk in the project area. Section 4.2.1.3 describes the design standards that the treatment plant, pipelines and discharge structures would have to meet to withstand the level of earthquake hazard anticipated for the area.

Response to Comment I14-5

The discussion of groundwater depth is based on credible, widely accepted documentation backed by the opinion of licensed hydrogeologists familiar with the area. This documentation provides information at a level of detail sufficient for environmental impact analysis. If necessary, groundwater depths would be investigated in greater detail during facility design. The discussion of the near surface geology at the Stillwater is similarly based.

Response to Comment I14-6

These uncertainties exist because King County has been unable to gain access to the upland discharge study area. As a result, the EIS, as prescribed by SEPA, presents a worst case analysis of the upland discharge alternative's potential environmental impacts. Please also see the response to comment Casey, I1-1 and Chapter 6, Section 6.2.3.3.

Response to Comment I14-7

Please see the response to comment I14-6.

Response to Comment I14-8

Please see the response to comment I14-6.

Response to Comment I14-9

Please see the response to comment Casey, I1-1.

Response to Comment I14-10

Chapter 4, Section 4.1.4.3 has been revised to provide more detail on the geology of the upland discharge study area. This revision clarifies that the two sections are consistent.

Response to Comment I14-11

Please see the response to comment Casey, I1-1.

Response to Comment I14-12

The City of Carnation considered this and other on-site wastewater treatment and disposal alternatives, as noted in Chapter 3, Section 3.4.1. Please see the City plans referred to in that section for more detail on the issues associated with these alternatives.

Response to Comment I14-13

Please contact PHSKC for the requested information concerning the statements made in their 2003 letter.

Chapter 3, Section 3.4.1 notes the wastewater treatment and disposal alternatives considered by the City of Carnation. Please see the City plans referred to in that section for more detail on the issues associated with these alternatives.

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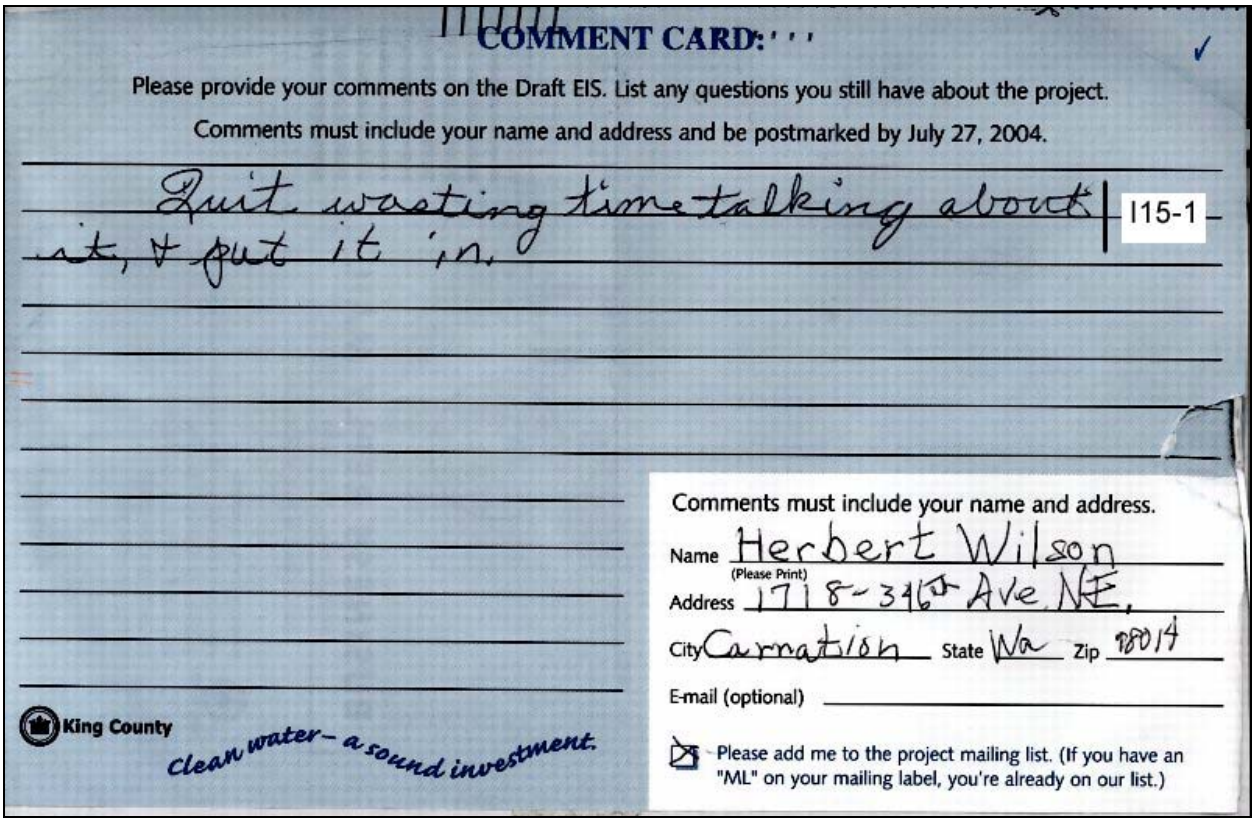

COMMENT CARD:

Please provide your comments on the Draft EIS. List any questions you still have about the project.

Comments must include your name and address and be postmarked by July 27, 2004.

Quit wasting time talking about it, & put it in. I15-1

King County

clean water– a sound investment.

Comments must include your name and address.

Name Herbert Wilson
(Please Print)

Address 1718-346th Ave NE.

City Carnation State Wa Zip 98014

E-mail (optional) _____

Please add me to the project mailing list. (If you have an "ML" on your mailing label, you're already on our list.)

Wilson (I15)

Response to Comment I15-1

Thank you for your comment.

STATEMENT OF FRED BERESWILL

I'm Fred Bereswill, 4353 325th Avenue Northeast, Carnation.

A quick question, not having seen the EIS but one of the locations for the treatment plant, I think, is in one of the FEMA flood designations. And this past year or two, we've gone through the redesignation of all the FEMA flood designations in the city. And hopefully, that's going to be looked at as one of the places, either building in a particular spot or protecting it from floods.

H2-1

H2-2

And then I should think we should look at the floods in the Snoqualmie Valley in the discharge areas. What is that going to do? I grant that the Upland Discharge probably won't be affected by that, but the two in the valley may be. I should think, not having seen the EIS, hopefully that's going to be addressed and looked at.

H2-3

That's all I have. Thank you.

Public Hearing Testimony

(Organized in alpha order by last name)

Bereswill (H2)

Response to Comment H2-1

Portions of both proposed treatment plant sites are within the FEMA 100 year floodplain. Please see Chapter 6, Section 6.1.3 of the Final EIS for more detail on portions of the site in the floodplain. To determine accurately how much of each site is in the floodplain would require a site survey. This will take place during the treatment plant design process.

Response to Comment H2-2

The most recent FEMA floodplain data and designations have been used to prepare the EIS.

Response to Comment H2-3

Discharge from the proposed treatment plant would be about 0.4 mgd (0.6 cfs). This input is small compared to Snoqualmie River flows and no measurable impact on river levels is anticipated. Please see Chapter 6, Section 6.2.3.1 of the Final EIS for more details.

STATEMENT OF JANE HARTWELL

H4-1 I prefer the wetlands solution. Jane Hartwell, H-A-R-T-W-E-L-L. 1805 280th Avenue Northeast, Carnation, 98014.

And if the treatment plant is going to be here, by the cement, would it have buffer and greenery around it? So probably I'd prefer the treatment plant, the other one that's in the back over by the residential. H4-2

That's all. Thank you.

Hartwell (H4)

Response to Comment H4-1

Thank you for your comment.

Response to Comment H4-2

As stated in the Draft EIS, no matter which treatment plant site is selected the buildings and grounds would be designed and landscaped to be compatible with the existing neighborhood.

STATEMENT OF PAUL WITTROCK

I am Paul Wittrock, 10810 298th Avenue Northeast in Carnation, 98014.

Thank you, King County, for coming out. And my concerns are regarding the treatment plant processing of the wastewater, the effluent. It sounds like you're doing a good job of taking out the biological components.

But the analysis that King County performed comparing the wastewater effluent to drinking water -- which is often the comparison that is made, holding up clear glasses of water, of effluent, and comparing them to drinking water -- your analysis showed that there is extremely high levels of chemicals in solution in this wastewater. Household wastes, cleaners, industrial things that are used in commercial processes in the cities that have sewers aren't taken out by your process. At least you didn't explain that they were.

H1-1

So I'd like to ask, if you could tonight, to touch on that and show and tell us if they are removed because it sounds like you're either, A, going to put these in the river, in Stillwater Wildlife Area where they would bio-accumulate. The animals, creatures there would be exposed to these ongoing accumulations of chemicals.

H1-2

And the only thing that sounds like they could be

Wittrock (H1)

Response to Comment H1-1

The EIS shows drinking water standards in Table A-11 in Appendix A. That table compares water quality standards established by the State of Washington for the chemicals listed. The table is not a list of chemicals expected to be present in the highly treated water discharged from the Carnation Wastewater Treatment Facility. Rather, the table shows acceptable levels of the listed chemicals in surface, ground and drinking waters in the State of Washington, whatever the source of those chemicals might be.

In Chapter 6, Section 6.2, the Draft EIS discusses the potential impacts and mitigation measures of discharging the highly treated water to the environment. In particular, the discussion of chemical contaminants beginning on page 6-23 points out that organic chemicals (e.g., those found in household cleaners) typically enter the waste stream in small quantities and that most would be removed by the treatment process.

In Chapter 1, Section 1.9.2, the EIS explains why King County's design of and policies for the Carnation Wastewater Treatment Facility would ensure that the highly treated water discharged from the facility would meet or be better than regulatory standards. These include the high pollutant removal achieved by the MBR process, regulatory restrictions on the types and amounts of potentially harmful materials that Carnation businesses would be allowed to discharge to the sewer system, and the County's policy of complying with all applicable permit standards now and in the future.

Response to Comment H1-2

As described in the response to the previous comment, the Carnation Wastewater Treatment Facility would achieve a high level of pollutant removal. This level of removal would produce water that meets or is of higher quality than State water quality standards. These standards are designed to protect aquatic life from bioaccumulation of listed contaminants. King County continuously monitors the scientific literature for chemicals that are of concern that don't have water quality standards. King County also takes water samples from various parts of its service area and analyzes these samples for many of these chemicals. King County would monitor the highly treated water discharged from the treatment plant to meet regulatory requirements. For these reasons and for the other reasons given in Chapter 7, Section 7.2.2.2, the impacts of discharging highly treated water to the wetlands are expected to be insignificant.

handled in some form or another would be the Upland Discharge where the accumulations of chemicals could be scraped out occasionally and disposed of in some other way. Then, there's other issues with putting the wastewater up there that the neighbors up there have concerns about.

It sounds like the best way -- right now, we have no effluent going into the river at all, near as I can tell. The best solution is to not pollute the environment with this effluent. And so that's my comment.

H1-3

Response to Comment H1-3

As indicated in Chapter 6, Section 6.1.2.1, agricultural, residential and silvicultural areas have been documented as nonpoint sources of pollutants throughout the lower Snoqualmie River system. And as indicated in Chapter 6, Section 6.2.5, if the treatment facility were not built, the risk to surface and groundwater quality would continue at present or increased levels as aging septic systems continued to fail. Finally, as stated in Chapter 6, Section 6.2.3.1, the combination of low pollutant levels in the highly treated water discharged from the plant and rapid dilution in the river are expected to result in no significant adverse impacts to the river's water quality.

STATEMENT OF PAUL WITTROCK (Continued)

The alternative of exploring onsite sewage disposal for the commercial development in Carnation has not been adequately explored, similar to the grocery store-shopping center where there's onsite community drain field which doesn't pollute the river, the uplands, or the wetlands with the chemicals and heavy metals that are effluent from the -- what do you call it? -- the membrane bioreactor process. H3-1

So this should be also explored in the Environmental Impact Statements. And this onsite sewage disposal should also be explored from a cost standpoint for the citizens of Carnation.

I think that's all.

Wittrock (H3)

Response to Comment H3-1

The City of Carnation considered on-site wastewater treatment and disposal alternatives, as noted in Chapter 3, Section 3.4.1. Please see the City plans referred to in that section for more detail on the issues associated with these alternatives.

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Changes in the EIS Made in Response to Comments

This section of the Final EIS Addendum contains changes made in the EIS in response to comments received on the Draft EIS. The changes are organized by chapter of the Draft EIS. Only chapters containing changes are included in this section. Within these chapters, only those numbered sections, subsections, tables or figures containing changes are provided. These sections, etc. are provided in their entirety. A list of the changed elements is provided on the title page for each chapter. For the Final EIS these elements take the place of their predecessors from the Draft EIS. The complete Final EIS consists of these changed elements, the unchanged elements of the Draft EIS, and the responses to comments.

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Chapter 1
Summary

Only sections or other elements of Chapter 1 revised for the Final EIS are included here. These changed sections combined with the unchanged sections of Chapter 1 in the Draft EIS constitute Chapter 1 of the Final EIS. Please see the introduction to the "Changes Made in the Draft EIS in Response to Comments" section for a full explanation.

The following changed elements of Chapter 1 are presented on the indicated pages. All other sections of Chapter 1 remain unchanged from the Draft EIS. Please consult the Draft EIS for those sections.

Changed Section **Page**

Changed Figure

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Chapter 1
Summary

This chapter provides a summary of the information contained in the Final Environmental Impact Statement (EIS) for the Carnation Wastewater Treatment Facility. The chapter begins with an overview of the proposal to construct and operate a new facility to meet the wastewater treatment needs of the City of Carnation, Washington. The facility would consist of a treatment plant, conveyance pipeline, and discharge facilities. After this overview, the chapter briefly describes treatment facility alternatives evaluated in the EIS, including the No Action Alternative. Other information provided in this chapter includes summaries of timing, environmental impacts, mitigation measures of the proposal, and areas of uncertainty and issues to be resolved concerning the proposal. All references and figures cited in this and the other chapters of this EIS can be found at the end of the chapters.

On June 28, 2004, King County issued a Draft EIS under the State Environmental Policy Act (SEPA) to provide environmental information to the public and agencies and to solicit comments on the proposals and issues discussed in the EIS. King County accepted comments on the Draft EIS during a 30-day public review period. See the Fact Sheet at the beginning of the EIS for details. The Final EIS responds to all substantive comments on the Draft EIS submitted during the comment period.

Pursuant to WAC 197-11-560(5), this Final EIS has been prepared in the form of an addendum. The Final EIS consists of the Draft EIS and the addendum. The addendum consists of an updated fact sheet, responses to comments received on the Draft EIS and changes to the EIS. Copies of the addendum are being sent to recipients of the Draft EIS and those who commented on the Draft EIS.

The King County Executive, in consultation with the City of Carnation, will use the environmental information in the Final EIS along with cost, engineering, community, and policy information to make a decision on the Carnation Wastewater Treatment Facility.

1.1.1 Change in Project Description

There have been two changes in the project description since the Draft EIS was issued. The first change is that a one-acre parcel adjoining the northeast edge of the City-owned site described in the Draft EIS has been added to that site (see revised Figure 1-2). This parcel is also owned by the City. A single-family residence and outbuilding currently occupy the parcel. See Chapter 3 for further information. The second change is that the construction period for the basic wetland discharge option could be as long as 6 to 8 weeks. Neither of these changes would substantially change the impacts discussed in the Draft EIS.

1.3 Benefits and Disadvantages of Reserving for Some Future Time the Implementation of the Proposal

As stated in the State Environmental Policy Act (SEPA) (WAC 197-11-440[5][c][vii]), an agency preparing an EIS should discuss the benefits and disadvantages of reserving for some future time the implementation of the proposal as compared with possible approval at this time. The agency perspective should be that each generation is, in effect, a trustee of the environment for succeeding generations. Particular attention should be given to the possibility of foreclosing future options by implementing the proposal. King County has evaluated the issues and impacts associated with delaying or moving ahead with the Carnation Wastewater Treatment Facility project.

As explained in the section of this chapter on the purpose and need for the project, the City is currently a “public health hazard” area as declared by the Public Health-Seattle & King County in 1988 and reaffirmed in 2003. The public health hazard has to do with failing septic systems, which are a source of pollution to ground and surface waters. Deferring the wastewater treatment facility will prolong and exacerbate this adverse condition; thus the project needs to move ahead. In this case, Carnation's proximity to important salmonid habitat that includes prime Chinook spawning areas highlights the environmental necessity of proceeding with the project.

1.9.5 Water Conservation

Water conservation has been shown to potentially reduce water consumption rates and thus the volume of wastewater to be treated. The feasibility of conservation measures to reduce the amount of water used and then discharged to the wastewater system for collection and treatment was analyzed in the "City of Carnation 2004 Comprehensive Sewer Plan" (Carnation, 2004). In addition, King County evaluated water conservation measures in planning the Carnation Wastewater Treatment Facility. The evaluation is included in "Carnation Wastewater Treatment Facility Technical Memorandum No. 2 Population, Flow, and Loads" that has been published with the Final EIS (Carollo, 2004).

Water conservation opportunities include installation of low-flush toilets and low-flow showerheads, faucets and appliances (such as clothes washers) and leak repair in residences and/or businesses that would reduce the amount of water used. This approach to water conservation has been tested and/or implemented to various degrees in many U.S. cities including San Francisco and Albuquerque as well as throughout the world in countries such as Canada and Australia (Carollo, 2004).

To evaluate water conservation opportunities, four levels of flow assumptions were analyzed to provide a range of what could possibly be achieved. These levels are described below.

The first level of flow assumptions (Option 1) is based upon simply applying the existing building codes to all new development. The second level of flow assumptions (Option 2) considers upgrading all of the existing residents to meet the current building code requirements. The third level (Option 3) assumes implementation of an aggressive water appliance (such as clothes washing machine) retrofit program with full retrofitting of all existing and future residential homes. The fourth level (Option 4) adds retrofit of businesses and schools to the residential retrofit in Option 3.

The "City of Carnation 2004 Comprehensive Sewer Plan" and King County Carnation Wastewater Treatment Facility "Technical Memorandum No. 2 Population, Flow, and Loads" make the following conclusion on the implementation of water conservation options discussed above.

> The City has already planned for a more moderate level for water conservation. Committing to an aggressive water demand management capital program as represented by Options 2-4 would require that both the City and County accept a certain amount of risk in that the design of the treatment plant and the collection system would be based upon reduced flows resulting from these efforts. Likewise, the current design is conservative with the resulting risk of designing facilities that are larger than necessary and therefore more costly. If the conservation program proved to be ineffective and the reduced flows are not realized, or realized to a lesser extent, then the sewer system would have to be upgraded, at significant cost, to accommodate increased flows. Additionally, zoning changes may occur when sewer is imminent that may allow for zoning designations with increased densities in certain portions of the City which would tend to increase overall flows.

> We recommend that the cost savings for the treatment plant and the program cost for the demand management program be further refined and evaluated at the facilities planning stage of the project. The City of Carnation will consider implementing the most aggressive demand management program that in the City's opinion, using its reasonable assumptions, provides a positive benefit/cost ratio to the citizens of Carnation. The benefits to the citizens of Carnation may or may not be the same as the benefits to the overall sewer project (Carnation, 2004).

At this writing it has not been determined which additional conservation measures will be employed in Carnation. Should conservation measures reduce the capacity of wastewater facilities, construction impacts would be similar or somewhat less than those discussed in this Final EIS (e.g., potentially smaller quantities of excavated materials and resulting truck haul trips). The amount of impervious surface at the treatment plant might also be reduced somewhat, depending upon how much capacity could be reduced. Energy needs to treat reduced wastewater volumes could be reduced, although solids volumes would not be reduced and more concentrated wastewater could require more energy for some process elements. The volume of water discharged to the river, wetland or upland site would be reduced, although the volume of contaminants remaining after MBR treatment would be the same.

Besides potential reductions in size and impacts of wastewater facilities, conservation would reduce the amount of potable water that the City of Carnation must treat and convey to end users. Further, retrofitting with low flow washing machines would reduce water heating and clothes drying demands in residences. Both of these would yield savings in energy use. In addition, more water would remain in surface water rather than being diverted to domestic use, potentially improving stream flows during low water months.

1.10 Public and Agency Review

Beginning in January 2003, King County conducted extensive public involvement activities for the project. Some of these activities are as follows:

- Twenty-five interviews with community and interest group representatives to gather input regarding concerns, issues and opinions about the treatment facility and ways to involve the public
- Four Citizen Advisory Committee meetings on facility siting, to obtain input on the development and application of siting criteria, and on the results of the siting process
- Six community meetings to provide information about the project, obtain feedback on the siting process and criteria, and discuss the treatment process and discharge options and explain the decision process and factors
- A site tour at Stillwater Wildlife area in conjunction with the Washington State Department of Fish and Wildlife, to discuss the wetlands enhancement discharge options
- Numerous meetings with property owners near the treatment plant sites and discharge locations
- Attendance and participation at the City of Carnation's open houses and City Council meetings
- Frequent briefings to tribes, political leaders and community and interest groups
- A charrette to identify wetland discharge alternatives, attended by stakeholder groups, permitting agencies, and resource agencies.
- Three fact sheets to provide information about the project
- An ongoing project Web site, to provide updated project information
- Staffing an information booth at Carnation's Fourth of July Festival each year
- A toll-free telephone number and e-mail address to receive public input and questions
- Three newsletters and several updates mailed to area citizens and project update mailings to a distribution list developed during activities listed above
- Responses to requests for information and questions from individuals and groups

In summer 2003, King County conducted an expanded SEPA scoping process for the Draft EIS under WAC 197-11-410. As lead agency for SEPA review, King County issued a Determination of Significance and scoping notice on July 28, 2003. The scoping notice described the alternatives being considered and requested comments on issues and alternatives to be addressed in the EIS.

About 4,000 scoping notices were distributed to potentially affected parties. A public hearing/open house was held at the Carnation Elementary School on August 6, 2003. A separate meeting for regulatory agency representatives was also held on that day. A notice was provided

on the project Web site, legal notices were placed in local newspapers, and other legal notification requirements were met. King County allowed more than 45 days for scoping comments to be prepared and submitted. The comment period ended on September 12, 2003.

King County received a total of 76 individual scoping comment submittals (letters, e-mails, mail-back comment forms from the scoping notices, and/or testimony to a court reporter) from 66 parties. Many submittals contained multiple comments. Of the 66 commenters, 53 were individual citizens, 9 were public agencies and 4 were interest groups or other organizations.

King County issued a Draft EIS on June 28, 2004 to provide environmental information to the public and agencies and to solicit comments on the proposals and issues discussed in the EIS. King County provided a 30-day public comment period for interested citizens, groups, agencies and governments to review the EIS and provide comments. A public hearing was held on July 14, 2004 to receive public testimony on the Draft EIS. The public comment period closed on July 27, 2004.

King County received comments from a total of 28 individuals, groups and government agencies. Of these, 19 were individuals, 8 were government agencies, and 1 was a private group. The comments and King County's responses are provided in this Final EIS.

The Final EIS will be one of the tools used by the King County Executive, in consultation with the City of Carnation, in making a decision on the Carnation Wastewater Treatment Facility. The Final EIS provides information on the potential environmental impacts of the proposal. The Executive and the City of Carnation will take these and other factors, including cost, engineering, community, and policy issues, into account in reaching a final decision.

1.11 References

Bishop, G. 2003. Supervisor, Community Environmental Health, Public Health-Seattle & King County. Letter to City of Carnation regarding Sewer Development in the City of Carnation. September 9, 2003.

Carnation, City of. 2004. *2004 Comprehensive Sewer Plan.* Carnation, WA: City of Carnation.

Carnation, City of. 1997. *City of Carnation 1996 Comprehensive Plan.* Carnation, WA: City of Carnation.

Kleeberg, C. 1988. Director, Environmental Health Division, Public Health-Seattle & King County. Letter to City of Carnation regarding Sewer Development in the City of Carnation. April 19, 1988.

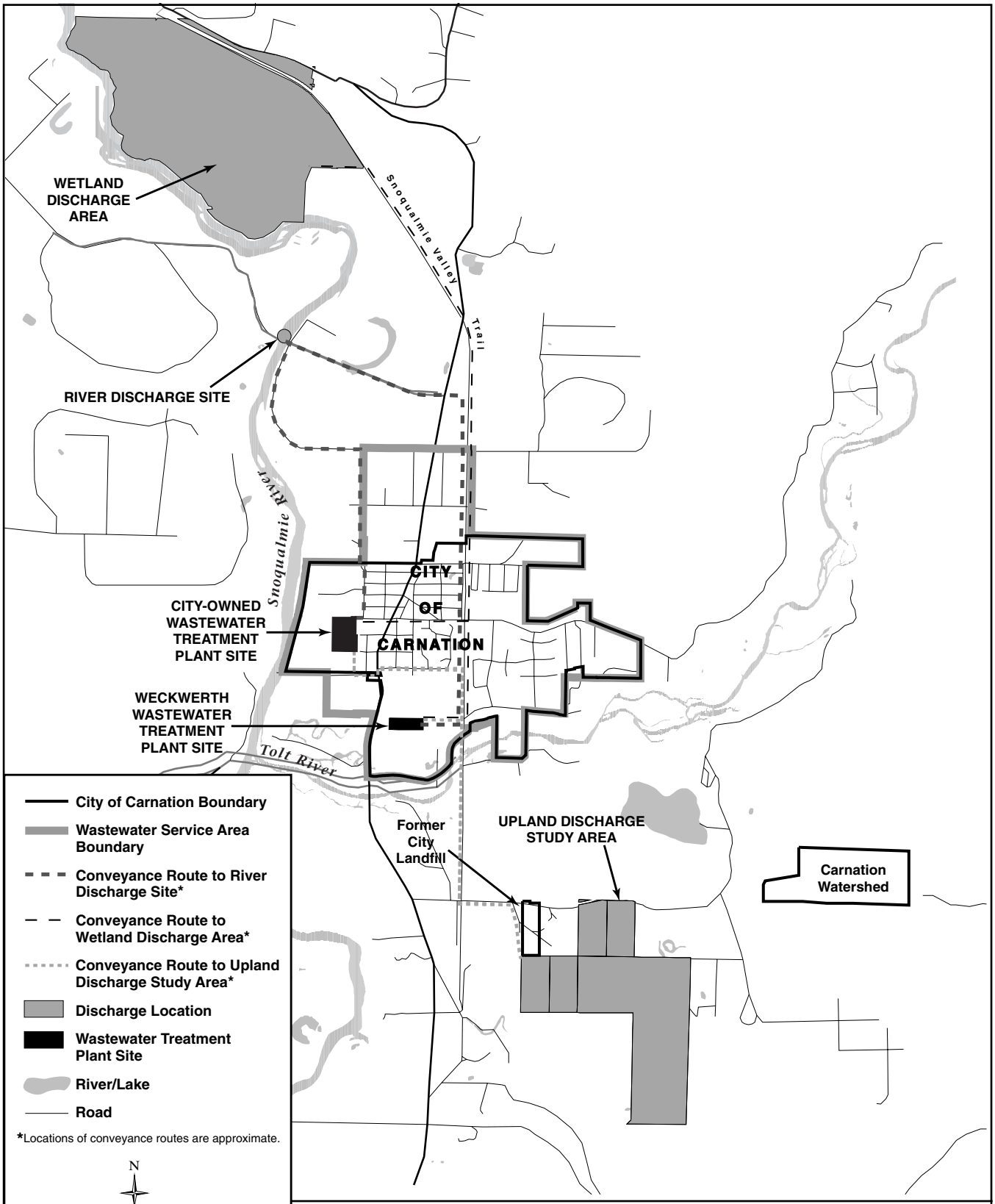

Figure 1-2

Alternatives Being Considered in the Draft EIS

CARNATION WASTEWATER TREATMENT FACILITY FINAL EIS

King County
Department of
Natural Resources and Parks
Wastewater Treatment Division

Data Sources: King County datasets. **File Name:** 0403_01-2_Figure.eps **Prepared by:** King County WLR Visual Communications & Web Unit

Chapter 3
Description and Comparison of Alternatives

Only sections or other elements of Chapter 3 revised for the Final EIS are included here. These changed sections combined with the unchanged sections of Chapter 3 in the Draft EIS constitute Chapter 3 of the Final EIS. Please see the introduction to the "Changes Made in the Draft EIS in Response to Comments" section for a full explanation.

The following changed elements of Chapter 3 are presented on the indicated pages. All other sections of Chapter 3 remain unchanged from the Draft EIS. Please consult the Draft EIS for those sections.

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3.1.1.3 Site Locations and Characteristics

City-Owned Site

The City-owned site is a10-acre site located in the City of Carnation, west of the City's business district at the west end of Entwistle Street (Figure 3-3). This generally flat, rectangular area is largely vacant and undeveloped. There are two structures in the northeast corner of the site: a single-family residence and outbuilding. The site is zoned for light industrial and manufacturing use. The house is currently being leased by the Snoqualmie Tribe. King County's Tolt-MacDonald Park is on the west. To the south and east are mainly industrial properties, with an apartment complex to the south as well. To the north is an open field.

Weckwerth Site

The Weckwerth site is a privately-owned 5-acre parcel on the south edge of the city immediately east of the fire station (Figure 3-3). This flat, rectangular parcel has been graded and is mainly used for equipment and materials storage and vehicle parking. There is a house near the western edge of the parcel. The site is zoned for light industrial and manufacturing use. The site is bordered on the north by the Tolt Middle School, on the west by a fire station, on the east by a concrete fabrication facility and on the south by undeveloped private land. The middle school's closest buildings are a little over 60 feet from the site's northern boundary.

3.1.2.2 Wetland Discharge

Under the wetland discharge alternative, the highly treated water would be conveyed to the Washington State Department of Fish and Wildlife's Stillwater Wildlife Area. This approximately 450-acre area is located about 2 miles north of Carnation between the Snoqualmie Valley Trail on the north and east and the Snoqualmie River on the south and west. Harris Creek and a smaller unnamed stream cross the area, passing through several of the oxbows before discharging to the Snoqualmie River (Figure 3-5). This alternative is discussed here in two forms: the Basic Option and the Expanded Option. Both options are shown in Figure 3-5 and described below. The two options are conceptual; design changes may occur based on site-specific studies that would be conducted if this discharge alternative were selected. Factors that may influence where created or enhanced wetlands are used to discharge highly treated water include the proximity of the wetlands to fish bearing waters and hydrologic investigations to determine flood frequency of the Stillwater Wildlife Area. Construction could take 4 to 8 weeks depending on whether the basic or expanded option was chosen and on final design characteristics.

Table 3–2. Comparison of Impacts of Treatment Plant Site Alternatives

Impacts Common to All Action Alternatives	City-Owned Site	Weckwerth Site	No Action Alternative
EARTH			
Construction: Temporary erosion, sedimentation; possible contamination from leaks or spills; possible excavation of contaminated soil; possible settlement due to vibration. Up to 4,300 cy of excavation/backfill for either site. Operation: Erosion, sedimentation from stormwater runoff; moderate to high seismic risk.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives.	Wastewater would continue to be discharged to the soil through on-site septic systems, resulting in less treatment than would be provided by the treatment plant. Properly functioning on-site septic systems would treat wastewater through soil filtration. Failing on-site septic systems would discharge wastewater directly to the ground. Continued reliance on aging on-site septic systems could result in failures during seismic events.
AIR			
Construction: Potential fugitive dust, construction vehicle exhaust emissions, and odors from paving. Operation: Potential emission of odors and volatile organic compounds and aerosols.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives.	As aging on-site septic systems fail, potential for odor impacts increases.
WATER			
Construction: Local, short-term impacts to surface or groundwater could occur due to erosion, dewatering or leaks and spills from construction equipment. Sediment reaching surface waters could increase turbidity and levels of solids, nutrients and other pollutants in those waters. Dewatering could temporarily divert surface and ground water that feeds streams or wetlands.	Construction: See impacts common to all action alternatives.	Construction: See impacts common to all action alternatives.	

Table 3-2. Comparison of Impacts of Treatment Plant Site Alternatives (contd.)

Impacts Common to All Action Alternatives	City-Owned Site	Weckwerth Site	No Action Alternative
Operation: Highly treated water meeting all regulatory requirements would be discharged to the environment. In the extremely rare cases of chemical spills or treatment plant overflows, chemicals or partially-treated wastewater could be discharged to the treatment plant stormwater system and flow to and temporarily pollute nearby surface waters. Wastewater that is currently discharged to on-site systems would be given a higher level of treatment. New impervious surfaces would increase local stormwater runoff, carrying some pollutants to surface and groundwater.	Operation: See impacts common to all action alternatives.	Operation: See impacts common to all action alternatives.	Wastewater would continue to be discharged to the soil through on-site septic systems, resulting in less treatment than would be provided by the treatment plant and potentially reducing water quality in the region. Properly functioning on-site septic systems would treat wastewater through soil filtration. Failing on-site septic systems would discharge wastewater directly to the ground.
BIOLOGICAL RESOURCES			
Construction: If sediment from construction or leaked/spilled chemicals from construction equipment reached surface waters, aquatic organisms could be adversely affected. Dewatering could temporarily divert surface and ground water that feeds streams or wetlands and potentially adversely affect aquatic organisms. Construction noise, lighting and other human activity could adversely affect some wildlife.	Construction: See impacts common to all action alternatives.	Construction: See impacts common to all action alternatives.	Wastewater would continue to be discharged to the soil through on-site septic systems, resulting in less treatment than would be provided by the treatment plant and potentially reducing water quality and adversely affecting aquatic organisms in the region.

Table 3-2. Comparison of Impacts of Treatment Plant Site Alternatives (contd.)

Impacts Common to All Action Alternatives	City-Owned Site	Weckwerth Site	No Action Alternative
Some low-quality wildlife habitat would be eliminated. Operation: In the extremely rare cases of chemical spills or treatment plant overflows, chemicals or partially-treated wastewater could be discharged to the treatment plant stormwater system and flow to and temporarily pollute nearby surface waters, potentially adversely affecting some aquatic organisms. The improved treatment provided by the treatment facility would benefit biological resources. New impervious surfaces would increase local stormwater runoff, carrying some pollutants to surface and ground waters, possibly adversely affecting some aquatic organisms. Increased noise, light and human activity could adversely affect some wildlife.	Operation: See impacts common to all action alternatives. Loss of up to 3 acres of disturbed upland grassland habitat.	Operation: See impacts common to all action alternatives. Loss of up to 3 acres of low quality developed habitat.	

Table 3-2. Comparison of Impacts of Treatment Plant Site Alternatives (contd.)

Impacts Common to All Action Alternatives	City-Owned Site	Weckwerth Site	No Action Alternative
ENERGY			
Construction: Electrical energy and fossil fuels would be used during construction. Operation: Electrical energy would be used for treatment plant operation. Fossil fuels would be used for the emergency generator and transport of materials to/from the site. Annual energy consumption of 150 MWh would increase electrical demand in the City of Carnation but would not exceed the current service capacity.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives.	None of the project's potential impacts on energy resources would occur.
LAND AND SHORELINE USE			
Construction: No significant land or shoreline use impacts are anticipated. Construction could occur in the 100-year floodplain. Operation: No significant land or shoreline use impacts are anticipated.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives. Uses of house and outbuilding on northeast corner of site would be displaced.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives.	City of Carnation Comprehensive Plan Goals and Policies for growth management would not be met; there would be continued restriction on redevelopment and planned new development provided for in the comprehensive plan. The ability for the City to meet its density targets and provide urban levels of service would be severely hampered.

Table 3-2. Comparison of Impacts of Treatment Plant Site Alternatives (contd.)

Impacts Common to All Action Alternatives	City-Owned Site	Weckwerth Site	No Action Alternative
ENVIRONMENTAL HEALTH			
Construction: Varying levels of noise would be generated by construction activities. Low to moderate potential for encountering contaminated soils Chemical spills or leaks from construction equipment could occur. Operation: Treatment plant equipment would generate noise continuously. The treatment facility would discharge highly treated water meeting all regulatory requirements to the environment. In the extremely rare case of treatment plant overflow, wastewater or chemical spills could temporarily expose humans to health risks.	Construction: Short-term construction noises could impact nearby residential properties. Operation: See impacts common to all action alternatives.	Construction: Short-term construction noises could impact nearby school. Operation: See impacts common to all action alternatives.	Failing on-site septic systems could increase risks to public health. Properly functioning on-site septic systems would treat wastewater through soil filtration. Failing on-site septic systems would dispose of wastewater directly to the ground.

Table 3-2. Comparison of Impacts of Treatment Plant Site Alternatives (contd.)

Impacts Common to All Action Alternatives	City-Owned Site	Weckwerth Site	No Action Alternative
RECREATION			
Construction: Construction activities could affect use of nearby recreational facilities.	Construction: Construction activities could affect use of nearby recreational facilities, specifically Tolt MacDonald Park.	Construction: Construction activities could affect use to recreational facilities, specifically Memorial Park, Mariner's Field, and athletic fields at Tolt Middle School.	Continued use of on-site septic systems and their effects on water quality could deter in-water recreation in the area.
Operation: See site-specific impacts.	Operation: Recreational use of nearby park facilities, specifically Tolt MacDonald Park, could be affected by minor visual, lighting, noise and potential odor impacts.	Operation: Recreational use of nearby park facilities, specifically the athletic fields at Tolt Middle School, could be affected by minor visual, lighting, noise and potential odor impacts.	
AESTHETICS			
Construction: Temporary impacts from presence of construction materials and equipment, resulting in a cluttered visual environment in immediate vicinity of site.	Construction: See impacts common to all action alternatives.	Construction: See impacts common to all action alternatives.	Surfacing of wastewater could be a consequence of failing on-site septic systems, which could result in visual impacts.
Operation: A relatively large building with landscaping, architectural treatments and night lighting would result in a more urban visual character.	Operation: See impacts common to all action alternatives.	Operation: See impacts common to all action alternatives.	
CULTURAL RESOURCES			
Construction: Unknown cultural resources could be disturbed by excavation.	Construction: See impacts common to all action alternatives.	Construction: See impacts common to all action alternatives.	No impacts to cultural resources would occur.

Table 3-2. Comparison of Impacts of Treatment Plant Site Alternatives (contd.)

Impacts Common to All Action Alternatives	City-Owned Site	Weckwerth Site	No Action Alternative
Operation: No cultural resource impacts are anticipated.	Operation: See impacts common to all action alternatives.	Operation: See impacts common to all action alternatives.	
TRANSPORTATION			
Construction: About 3,500 one-way truck trips are anticipated during construction. Construction traffic could cause temporary traffic congestion on some streets Operation: About six truck trips and fewer than ten employee auto trips to/from the plant per week are anticipated.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives.	No significant adverse impacts on transportation would occur.
PUBLIC SERVICES AND UTILITIES			
Construction: Construction-related traffic congestion could temporarily affect emergency response times. Utility relocation may be necessary, with possible short-term interruptions of water or electrical service. Operation: Water, electrical and telephone service extensions would be needed.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives.	Construction: See impacts common to all action alternatives; could affect neighboring fire station ingress and egress. Operation: See impacts common to all action alternatives.	Some public services providers could have difficulty adding to their facilities due to Health Dept. regulations for expansion/new construction of on-site septic systems.

Table 3–3. Comparison of Impacts of Discharge Alternatives

Impacts Common to All Action Alternatives	River Discharge	Wetland Discharge	Upland Discharge	No Action
EARTH				
Construction: Temporary erosion, sedimentation. Operation: Moderate to high seismic risk.	Construction: Smallest excavation volume, about 50 cy. Operation: See impacts common to all action alternatives.	Construction: Excavation volume up to 4,000 cy. Operation: See impacts common to all action alternatives.	Construction: Excavation volume about 4,700 cy. Operation: See impacts common to all action alternatives. Also some earth disturbance during periodic rototilling.	Same as treatment plant site impacts.
AIR				
Construction: Potential fugitive dust and construction vehicle exhaust emissions. Operation: No air resources impacts are anticipated.	Construction: See impacts common to all. Operation: No air resources impacts are anticipated.	Construction: See impacts common to all. Operation: No air resources impacts are anticipated.	Construction: See impacts common to all. Operation: Minor dust emissions during periodic rototilling.	Same as treatment plant site impacts.
WATER				
Construction: Local, short-term impacts to surface or groundwater could occur due to erosion, dewatering or leaks and spills from construction equipment.	Construction: See impacts common to all action alternatives. Greater potential than other alternatives for erosion, sedimentation, leaks or spills to impact water quality in the Snoqualmie River.	Construction: See impacts common to all action alternatives. Greater potential than other alternatives for erosion, sedimentation, leaks or spills to impact wetlands and streams.	Construction: See impacts common to all action alternatives.	Same as treatment plant site impacts.

Table 3-3. Comparison of Impacts of Discharge Alternatives (contd.)

Impacts Common to All Action Alternatives	River Discharge	Wetland Discharge	Upland Discharge	No Action
Sediment reaching surface waters could increase turbidity and concentrations of solids, nutrients and other pollutants in those waters. Dewatering could temporarily divert surface and ground water that feeds streams or wetlands.		Constructed wetlands would likely be located within 100-year floodplain of Snoqualmie River.		
Operation: In the extremely rare case of treatment plant overflows or failure of disinfection, partially-treated wastewater could be discharged and adversely affect water quality.	Operation: Highly treated water would be discharged to the river, potentially affecting water quality in the mixing zone.	Operation: Highly treated water would be discharged to wetlands. No significant adverse impacts to surface waters anticipated. Placement of large woody debris would assist in retaining water in the wetlands longer than at present.	Operation: Highly treated water would be discharged to the ground, infiltrating to groundwater. No significant adverse impacts to groundwater anticipated. Without adequate depth of gravel soils, groundwater mounding could occur due to low-permeability subsurface conditions.	
BIOLOGICAL RESOURCES				
Construction: If sediment from construction or leaked/spilled chemicals from construction equipment reached surface waters, aquatic organisms could be adversely affected. Construction dewatering could temporarily lower stream and/or wetland water levels,	Construction: See impacts common to all action alternatives. Construction activities could disturb bald eagles, great blue herons, bog clubmoss and salmonids. Greater potential than other alternatives for erosion,	Construction: See impacts common to all action alternatives. Construction activities could disturb bald eagles great blue herons, bog clubmoss and salmonids. Greater potential than other alternatives for erosion,	Construction: See impacts common to all action alternatives. Operation: About 10 acres of upland forest or grassland habitat would be eliminated.	Same as treatment plant site impacts.

Table 3-3. Comparison of Impacts of Discharge Alternatives (contd.)

Impacts Common to All Action Alternatives	River Discharge	Wetland Discharge	Upland Discharge	No Action
which could adversely affect some aquatic organisms. Construction noise, lighting and other human activity could adversely affect some wildlife. <u>Operation</u>: In the extremely rare case of treatment plant overflows or failure of disinfection, partially-treated wastewater could be discharged and adversely affect aquatic organisms.	sedimentation, leaks or spills to reach Snoqualmie River and affect aquatic organisms. Greater potential than other alternatives to adversely affect Chinook salmon spawning habitat. <u>Operation:</u> Highly treated water would be discharged to the river potentially affecting aquatic organisms in the mixing zone.	sedimentation, leaks or spills to reach local wetlands and streams and affect aquatic organisms. <u>Operation:</u> Highly treated water would be discharged to wetlands, improving habitat value for native species. Large woody debris could be added and fish passage barrier removed to further enhance habitat.		
ENERGY				
<u>Construction:</u> Electrical energy and fossil fuels would be used during construction. <u>Operation:</u> No energy impacts are anticipated.	<u>Construction:</u> See impacts common to all action alternatives. <u>Operation:</u> Energy would be required to pump highly treated water to this discharge site.	<u>Construction:</u> See impacts common to all action alternatives. <u>Operation:</u> Energy would be required to pump highly treated water to this discharge site.	<u>Construction:</u> See impacts common to all action alternatives. <u>Operation:</u> More energy would be required to pump highly treated water to this discharge site than would be required for other discharge alternatives because of the site's elevation. Fossil fuels would be used during periodic rototilling of infiltration basins.	Same as treatment plant site impacts.

Table 3-3. Comparison of Impacts of Discharge Alternatives (contd.)

Impacts Common to All Action Alternatives	River Discharge	Wetland Discharge	Upland Discharge	No Action
LAND AND SHORELINE USE				
Construction: See discharge alternative-specific impacts. Operation: See discharge alternative-specific impacts.	Construction: No land and shoreline use impacts are anticipated. Operation: Use of the shoreline at discharge site could be reduced.	Construction: No land and shoreline use impacts are anticipated. Operation: Wetland creation would cause loss of potential farm land.	Construction: No land and shoreline use impacts are anticipated. Operation: No long-term adverse land use impacts are anticipated.	Same as treatment plant site impacts.
ENVIRONMENTAL HEALTH				
Construction: Varying levels of noise would be generated by construction activities. Chemical spills or leaks from construction equipment could occur. Some potential to encounter contaminated soils. Operation: Exposure to highly treated water will have a negligible public health impacts. Minor noise associated with periodic inspection/ maintenance visits. In the extremely rare case of treatment plant overflows or failure of disinfection, partially-treated wastewater could be discharged and pose human health risks.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives. Highly treated water would be discharged to the river with the potential for extremely slight health risk from contact with water in the immediate vicinity of discharge.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives. Highly treated water, would be discharged to the wetland with the potential for extremely slight health risk from contact with water in the immediate vicinity of discharge.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives. Highly treated water would be discharged into the ground with potential for extremely slight health risks from contact with groundwater. Some water supply wells could pump native water mixed to some degree with infiltrated water. No	Same as treatment plant site impacts.

Table 3-3. Comparison of Impacts of Discharge Alternatives (contd.)

Impacts Common to All Action Alternatives	River Discharge	Wetland Discharge	Upland Discharge	No Action
			significant adverse impacts on environmental health expected. Some noise associated with infrequent rototilling of infiltration basins.	
RECREATION				
Construction: Some access to recreational facilities could be temporarily displaced by construction activities and construction-related traffic.	Construction: Construction activity could temporarily displace nearby recreational uses on the Snoqualmie River.	Construction: Construction activities could temporarily displace nearby recreational uses in the Stillwater Wildlife Area and on the Snoqualmie Valley Trail.	Construction: Construction activities could temporarily affect activities at nearby youth camps.	Same as treatment plant site impacts.
Operation: See discharge alternative specific impacts.	Operation: No long-term recreational impacts are anticipated.	Operation: Improved wildlife habitat could enhance recreational activities.	Operation: No long-term recreational impacts are anticipated.	

Table 3-3. Comparison of Impacts of Discharge Alternatives (contd.)

Impacts Common to All Action Alternatives	River Discharge	Wetland Discharge	Upland Discharge	No Action
AESTHETICS				
Construction: Presence of construction materials and equipment would have temporary aesthetic impacts.	Construction: See impacts common to all action alternatives.	Construction: See impacts common to all action alternatives.	Construction: See impacts common to all action alternatives.	Same as treatment plant site impacts.
Operation: See discharge alternative-specific impacts.	Operation: Pipe could be visible during low-flow pierods.	Operation: Longer periods of standing water in certain areas and the presence of large woody debris would change the appearance of some parts of the Stillwater Wildlife Area.	Operation: The introduction of fencing and landscaping surrounding the discharge site would change the appearance of the immediate area.	
CULTURAL RESOURCES				
Construction: Unknown cultural resources could be disturbed by excavation.	Construction: See impacts common to all action alternatives. Stossel Bridge (eligible for National Register of Historic Places) could be affected by vibration from construction equipment if in close proximity.	Construction: See impacts common to all action alternatives.	Construction: See impacts common to all action alternatives.	No impacts to cultural resources would occur.
Operation: No cultural resource impacts are anticipated.	Operation: See impacts common to all action alternatives.	Operation: See impacts common to all action alternatives.	Operation: See impacts common to all action alternatives.	

Table 3-3. Comparison of Impacts of Discharge Alternatives (contd.)

Impacts Common to All Action Alternatives	River Discharge	Wetland Discharge	Upland Discharge	No Action
TRANSPORTATION				
Construction: See discharge alternative-specific impacts. Operation: Infrequent inspection and maintenance would generate about ten vehicle trips per year.	Construction: About 230 one-way truck and other vehicle trips anticipated. Operation: See impacts common to all action alternatives.	Construction: About 300 one-way vehicle trips anticipated. Construction vehicles accessing SR 203 may pose some risks to traffic safety. Operation: See impacts common to all action alternatives.	Construction: About 1,700 one-way vehicle trips anticipated. Operation: See impacts common to all action alternatives.	No impacts on transportation would occur.
PUBLIC SERVICES AND UTILITIES				
Construction: No Public Services and Utilities impacts are anticipated. Operation: No Public Services and Utilities impacts are anticipated.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives.	Construction: See impacts common to all action alternatives. Operation: See impacts common to all action alternatives.	Same as treatment plant site impacts.

3.2.2.1 City-owned Site to River Discharge

Potential temporary impacts from construction at the City-owned site could include earth moving, chemical leaks or spills from construction equipment, dust, erosion, sedimentation or other pollution of surface waters, changes in ground or surface water volumes and/or quality caused by dewatering, resulting effects on aquatic organisms, elimination of wildlife habitat and disturbance of wildlife, noise, health risks from accidental chemical leaks or spills, disturbance of cultural resources, traffic, and interference with some public services and/or utilities. Not all of these impacts would necessarily occur. Nearly all of those that did would be minor and temporary. Mitigation measures would be carried out where necessary to minimize impacts.

Potential long-term impacts associated with operation of the treatment plant would include improved treatment of wastewater previously discharged from on-site treatment systems. Long-term impacts could also include increased stormwater runoff with resulting erosion, sedimentation and contaminant transport, which in turn could cause adverse effects on water quality, plants and animals. Other impacts could include odors; rare overflows or chemical spills and resulting adverse effects on water quality, animals, plants and human health; adverse effects on wildlife from increased noise, lights and human activity; changed land use, including removal of the house leased by the Snoqualmie Tribe and the associated outbuilding; and changed appearance of and activities at the site. Mitigation measures meeting or exceeding permit requirements would be put in place where necessary to minimize potential impacts.

Impacts such as dust, noise, odor, environmental health risks and land use and aesthetic changes could affect human uses near the treatment plant site. These uses include industries on the east and south, an apartment complex on the south, baseball fields in Tolt-MacDonald Park to the southwest, and single-family residences located northeast of the site.

The conveyance pipeline route for this system runs north from the treatment plant site along Stewart Street and a private road to 310th Avenue NE. From there the route follows 310th Avenue NE west and north to the outfall at the Carnation Farm Road Bridge. The first quarter mile of this route has single-family residential uses to the east and open-space lands or low-density residential use areas on the west. The remaining 1.3 miles pass through mainly rural open-space lands.

Construction of the conveyance pipeline would have the same types of potential impacts as construction of the treatment plant. However, these impacts would be on a smaller scale because they would be associated with digging a single trench for an 8- to 10-inch diameter pipeline over a distance of about 1.6 miles. In addition, these impacts would be of much shorter duration at any given location because construction would be moving along the pipeline route.

This conveyance route is one of the two shortest routes (the Weckwerth site to upland discharge site route is the other route). Nearly all of the construction impacts would be of shorter duration than those associated with longer routes. In addition, since this route passes through less-developed areas than routes that pass through the city, construction would affect fewer users of land adjoining the route than the longer routes.

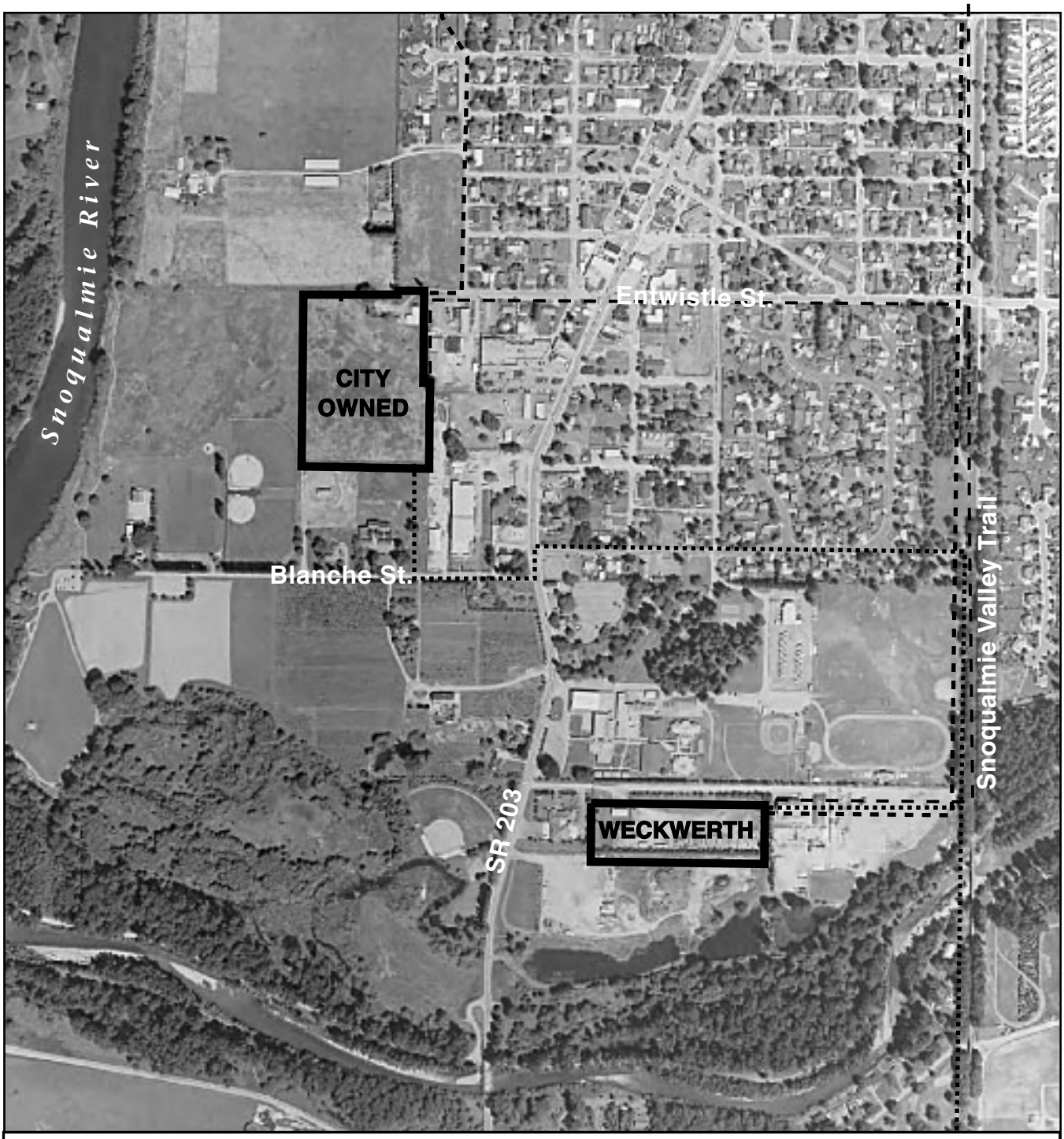
No known archaeological sites are in this system. No buildings or structures over 40 years old are on the City-owned site. One inventoried historic building and one uninventoried historic building are within 50 feet of the conveyance pipeline route. The Stossel (Carnation Farm Road) Bridge, located at the river discharge site, is eligible for listing in the National Register of Historic Places. This system has a high probability of encountering hunter-fisher-gatherer, ethnographic period, and historic Indian archaeological resources that may be significant. It has a low probability of encountering historic-period archaeological resources that may be significant.

The discharge for this system would be into the Snoqualmie River at the Carnation Farm Road Bridge. The resulting construction impacts would potentially be of the same types as described above for the treatment plant, but on a much smaller scale. However, unlike the impacts at the treatment plant site, these impacts would take place in riparian and aquatic areas.

The river discharge has greater potential for erosion, sedimentation, leaks or spills reaching the Snoqualmie River than the other discharge alternatives because it involves construction of an outfall in the river. For the same reason it also has a greater potential for displacing recreational activities during construction at the outfall location.

During treatment plant operation, this system has an extremely small potential to discharge partially-treated wastewater to the river in the event of overflows or disinfection failure. Such a discharge could have temporary adverse impacts on water quality, plants, animals and human health. The treatment plant would be designed with the extensive backup systems described earlier in this chapter to prevent discharge of partially-treated wastewater.

During treatment plant operation, this system would discharge highly treated water to the Snoqualmie River where it would be diluted in the water column. Fish, wildlife and humans would be exposed to the diluted highly treated water in the river. The State of Washington has determined that water of the quality of the highly treated water may be used in areas where human contact is possible.



- - - Conveyance Route to River Discharge Site*

– – Conveyance Route to Wetland Discharge Area*

▪▪▪▪▪ Conveyance Route to Upland Discharge Study Area*

▬ Treatment Plant Sites

*Locations of conveyance routes are approximate.

N

0 0.125 0.25 mile

June 2004

Figure 3-3

City-owned and Weckwerth Treatment Plant Sites

CARNATION WASTEWATER TREATMENT FACILITY FINAL EIS

King County
Department of
Natural Resources and Parks
Wastewater Treatment Division

Data Sources: King County datasets. **File Name:** 0403_03-3_Figure.eps **Prepared by:** King County WLR Visual Communications & Web Unit

Chapter 4
Earth Resources

Only sections or other elements of Chapter 4 revised for the Final EIS are included here. These changed sections combined with the unchanged sections of Chapter 4 in the Draft EIS constitute Chapter 4 of the Final EIS. Please see the introduction to the "Changes Made in the Draft EIS in Response to Comments" section for a full explanation.

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4.1.4.3 Upland Discharge: Existing Conditions

The upland discharge study area is located southeast of the City of Carnation. Site elevations range between 120 feet MSL at the northern portion of the area to over 200 feet MSL on the southern half of the site. Most of the soils on the site are Everett soils, a well-drained soil underlain by gravelly glacial outwash, suitable for infiltration. Associated soils include Alderwood, Bellingham, and Ragnar (see Table 4-1). Although King County was unable to gain access to the study area, borings at the adjacent City-owned landfill site and logs from nearby wells showed that this soil/outwash layer was about five to fifteen feet thick at locations near the study area.

The borings and well logs also revealed that a much less permeable layer of silty sands underlies the soil and outwash gravel. This layer is saturated, forming a water table aquifer that probably also exists beneath some or all of the study area.

The borings and well logs showed two other layers beneath the water table aquifer. A clay-rich layer immediately underlays the aquifer. This layer forms a confining layer for the water-bearing sediments below it. These sediments form a confined aquifer (Carollo, 2004).

Portions of the southern leg of the site contain mapped erosion hazard areas, and a small area at the southernmost corner of the site is a designated landslide hazard area (King County, 1990).

4.2.5 No Action Alternative

Under the No Action Alternative, no project construction or associated impacts on earth resources would occur. Wastewater would continue to be discharged to the soil through on-site septic systems, resulting in less treatment than would be provided by the treatment plant. Properly functioning on-site septic systems would treat wastewater through soil filtration. Failing on-site septic systems would provide little or no treatment, resulting in direct discharge of wastewater into groundwater in many cases. As a result, groundwater contamination would continue and increase (Brandon 2004). Continued reliance on aging on-site septic systems could result in failures during seismic events.

4.5 References

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Chapter 5
Air Quality

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5.2.1.3 Mitigation Measures Common to All Treatment Facilities

Construction Mitigation Measures Common to All Treatment Facilities

Mitigation measures that could be implemented to minimize construction impacts to air quality include the following:

- Utilize construction best management practices (BMPs) such as wetting and covering disturbed soils, washing tires and undercarriages of vehicles, vacuum-sweeping adjacent streets, and shutting off idling equipment.
- Clean up contaminated soils and groundwater (if discovered) before construction disturbs the contaminated areas.
- Provide 24-hour construction hotline for prompt response to questions and concerns.

Operation Mitigation Measures Common to All Treatment Facilities

Treatment Plant Odor Control

In addition to complying with all applicable air quality regulations, mitigation measures that could be implemented to minimize operation impacts to air quality include the following:

- Cover or enclose major treatment processes (influent pump station, headworks, and solids handling) and treat the air vented from these enclosures in an odor control station utilizing carbon scrubbing or a biofiltration unit to remove odors, hydrogen sulfide, and VOCs. Service odor control units regularly.
- Develop and implement an odor monitoring and response plan prior to startup of the treatment plant (during the permitting process). The plan could address the type, location, and frequency of monitoring, and the method and timeframe for response to odor complaints (for example, a 24-hour hotline for receiving/responding to complaints).
- Keep equipment and vehicles in good working order to reduce emissions.

Discharge Maintenance

Use the construction BMPs described above to minimize impacts to air quality during periodic maintenance of the river, wetlands, and upland discharge alternatives.

5.2.2.3 Mitigation Measures for Treatment Plant Alternatives

See the section titled Impacts and Mitigation Common to All Treatment Facilities. In addition, the following measures could be used at the treatment plant site:

- Locate the treatment plant at a location on the site as far away as practicable from potential sensitive receptors, such as the Tolt Middle School near the Weckwerth site.
- Locate the solids handling facilities on the far side of the treatment plant from potential sensitive receptors.
- At the Weckwerth site, seek a construction access easement farther away from the Tolt Middle School than the current access to the site.

Chapter 6
Water Resources

Only sections or other elements of Chapter 6 revised for the Final EIS are included here. These changed sections combined with the unchanged sections of Chapter 6 in the Draft EIS constitute Chapter 6 of the Final EIS. Please see the introduction to the "Changes Made in the Draft EIS in Response to Comments" section for a full explanation.

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6.1.3 Existing Floodways and Floodplains

The Snoqualmie and Tolt River floodways and regulatory 100-year floodplains were reviewed in relation to the proposed treatment plant, conveyance, and discharge alternatives. Floodway and floodplain mapping is based on the FEMA Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs). The mapping identifies which properties are within the 100-year floodplain and therefore subject to floodplain regulations. Figure 6-1 displays the King County GIS data layer and indicates, on a general scale, the existing floodway and floodplain areas. The King County GIS data is only a graphical representation of the floodplain boundary. The figure illustrates that portions of both the proposed wastewater treatment plant sites are in the 100-year floodplain. In addition to mapping floodprone areas FEMA FIRMs report flood elevations referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29). NGVD 29 is a geodetic reference for elevations, completed and adjusted in 1929. These elevations were used to define the mean sea level datum.

The King County GIS data indicates the City-owned site is approximately 70% within the 100-year floodplain. The FEMA FIS reports a base flood elevation (BFE) in the floodplain at the city owned site ranging between 69 and 70 feet. Ground elevations at the city-owned site range between 66 and 70 feet. Comparing the BFE to available ground survey data it is likely that greater than 70% of the site is in the 100-year floodplain.

The King County GIS data indicates the Weckwerth site is approximately 20% within the 100-year floodplain. The FEMA FIS reports a BFE in the floodplain at the Weckwerth Site ranging between 77 and 78 feet. Ground elevations at the Weckwerth Site range between 77 and about 106 feet. Comparing the BFE to available ground survey data it is likely that less than 20% of the site is in the 100-year floodplain.

King County, in collaboration with FEMA and Snohomish County, has recently begun work on the Lower Snoqualmie and Skykomish Flood Study. The study will update flood hazard maps for the lower Snoqualmie River as part of a FEMA Map Modernization Program. The project schedule anticipates that draft work maps will be prepared by mid-2005, preliminary FIRMs in 2006, and official FIRMs in 2007.

6.1.4 Existing Groundwater Resources

The project area is located within the East King County Ground Water Management Area (East King County Ground Water Advisory Committee, 1998a). Most of the valley surrounding the City of Carnation is designated as a critical aquifer recharge area and recognized in King County's Growth Management Act and critical aquifer recharge ordinance (Carollo, 2003b). The City of Carnation operates a single drinking-water well inside the city limits (depth of about 110 feet) with under 1,000 service connections (East King County Ground Water Advisory Committee, 1998b). Springs furnish approximately 90 percent of the city's drinking water (East King County Ground Water Advisory Committee, 1998b).

While site-specific explorations have not been conducted, the groundwater table is reported to be fairly shallow, generally within 5 to 10 feet below the ground surface at the proposed treatment plant sites. This depth is approximately at the river level (HWA GeoSciences, 2003). The King County Soil Survey (U.S. Soil Conservation Service, 1973) indicates that seasonally high water tables in the floodplain in the Carnation area are approximately 1 to 3 feet below ground surface. The higher water table during the winter months is likely a result of increased precipitation (Becker, personal communication, 2004).

In the Stillwater Wildlife Area where the wetland discharge alternative would be located, the near-surface geology is dominated by silt and clay deposited during flood events of the Snoqualmie River (Carollo, 2004b). These deposits are presumed to be underlain by more permeable fluvial deposits of the river. Because of the low-permeability sediments in the upper 10 feet in the Stillwater Wildlife Area, it is expected that there is little surface water/groundwater interaction. Surface water entering the area through streamflow or precipitation does not likely reach groundwater, and it is unlikely that there is significant upward transfer of water in the area (Carollo, 2004b).

In the proposed upland discharge area, a shallow aquifer is generally found at 15 to 20 feet below ground surface (See Chapter 4, Section 4.1.4.3). The discharge locations for the shallow aquifer have not been positively identified. It is believed that much of the water infiltrates downward to a confined aquifer below. In addition to the downward seepage, the shallow aquifer probably also discharges to local streams and wetlands. The Langlois Creek wetlands, in addition to other wetlands in the area, are within the elevation range of the shallow aquifer.

Most if not all of the homes within a 2000-foot radius of the upland discharge area (approximately 50 residences) use private wells for potable water supply. Since it appears there is only one house in the discharge area itself, there is likely only one water supply well in the discharge area (Carollo, 2003c; 2004a). None of the well logs on file with Ecology indicate that water is being withdrawn from the shallow aquifer; all water appears to be drawn from deeper aquifers. Because the area is not sewered, all of these homes are likely served by on-site septic systems. Septic system drainfields release water to the ground, which provides recharge to the groundwater system. In this case, recharge is to the shallow aquifer, although downward seepage does ultimately move this water into the lower confined aquifer as well (Carollo, 2004a).

6.2.2 Treatment Plant Alternatives: Impacts and Mitigation

Floodplain Impacts

Construction and operation of the treatment plant could potentially impact floodplain areas on either the City-owned or Weckwerth site. The Snoqualmie and Tolt River 100-year floodplains indicated on Figure 6-1 were obtained from King County GIS data and provide only a graphical representation. Detailed surveys have not been conducted, and FEMA floodplain studies for the Snoqualmie River are under revision.

Inspection of the GIS data indicates that the City-owned site is partially within the floodplain (approximately 70% or 7 acres). The current FEMA FIS reports base flood elevations (BFEs) ranging between 69 and 70 feet (NGVD 29). Ground elevations of the City-owned site are estimated at between 66 and 70 feet (NGVD 29). Comparing the BFE to the ground elevations suggests the 100-year flood would cover the majority of the site with up to 3 feet of water. No portion of the site is located within the Snoqualmie River floodway. Access to the site would be from Entwistle Street. Existing conceptual design indicates that the treatment plant and access routes to the site could be located on the highest ground of the site to avoid or minimize 100-year floodplain impacts. Until a survey of the site is conducted it cannot be determined if the treatment plant would be in the Snoqualmie River 100-year floodplain. Another factor that could affect whether the treatment plant would be in the Snoqualmie River 100-year floodplain is that the ongoing flood study for the lower Snoqualmie mentioned earlier in this chapter could change the BFEs on the FEMA FIRM and FIS. A change in either the mapped boundary or the BFEs could affect whether the treatment plant is in or out of the Snoqualmie River 100-year floodplain.

As reported earlier in this chapter the Weckwerth site is approximately 20 percent or 1.5 acres within the 100-year floodplain associated with the confluence of the Tolt and Snoqualmie Rivers (Figure 6-1). No portion of the site is located within the Tolt or Snoqualmie River floodway. The current FEMA FIS reports BFEs ranging between 77 and 78 feet (NGVD 29). With the exception of a small depression, the ground elevations of the Weckwerth site are estimated at between 77 and 106 feet (NGVD 29) resulting in less than 1 foot of water covering a small portion of the site during the 100 year flood. Access to the site would be from an existing unpaved road. Existing conceptual design indicates that the treatment plant and access routes to the site could be located on the highest ground of the site to avoid or minimize 100-year floodplain impacts.

If any portion of the treatment plant were built in the floodplain it would result in filling of an area and loss of flood storage capacity. Filling in the floodplain also displaces floodwaters and may cause flooding in other areas, including adjacent properties. Building in the floodplain may also constrict the area where water can flow. This can cause an increase in water velocities that may result in erosion problems.

Stormwater Runoff Impacts

During the dry weather season neither of the alternative treatment plant sites is located in close proximity to a water body that could be affected by runoff from construction. The City-owned site is located approximately 900 feet from the Snoqualmie River, and the Weckwerth site is located approximately 700 feet from the closest portion of the Tolt River mainstem.

A new treatment facility would result in the creation of new impervious surfaces. Runoff from these surfaces could result in additional stormwater runoff if not controlled in accordance with applicable rules and regulations. Stormwater runoff at the Carnation treatment plant would be managed in accordance with Ecology's *Stormwater Management Manual for Western Washington* (Ecology, 2001). See the section in this chapter titled Mitigation Measures Common to All Treatment Facilities for further discussion of stormwater mitigation measures.

Other surface water and groundwater impacts common to both treatment plant sites are discussed in the section titled Impacts and Mitigation Common to All Treatment Facilities.

Mitigation Measures for Treatment Plant Alternatives

Floodplain Mitigation Measures

Both construction and operation mitigation measures could be necessary to avoid potential impacts to the floodplain.

Should construction in the 100-year floodplain occur the following mitigation measures could be applied:

- Removal of excess excavation and other material including construction materials from the 100-year floodplain.
- During the flood season construction materials, temporary structures, and substances hazardous to health should be sited or stored outside the 100-year floodplain.

Any portion of the treatment facility or a discharge facility permanently located within the 100-year floodplain would be designed to meet flood-proofing and/or flood-protection elevation requirements under the City of Carnation development regulations for flood hazard areas, as well as FEMA regulations.

In addition to flood-proofing and/or flood protection the following mitigation measures could be applied:

- Completion of a flood hazard certification to determine if a flood hazard analysis is necessary.
- Perform flood hazard analysis, if determined necessary.
- As directed by the results of the flood hazard analysis create compensatory flood storage for any loss or displacement of flood storage and ensure the base flood elevations are not increased.

Prevention and Containment of Accidental Spills Common to Operation of All Treatment Facilities

If either the wetland or upland discharge alternative were selected, the treatment facility must provide storage to handle emergency and maintenance events to prevent any untreated or partially treated water from leaving the facility (Carollo, 2003a). The volume of emergency storage would equal the maximum daily flow volume of approximately 660,000 gallons. The treatment facility would be designed in accordance with state and federal design requirements and guidelines (Carollo, 2003b). The treatment plant design would include extensive BMPs and source controls to minimize the risk of contamination from spills and leaks, in the rare event that a spill occurs. Spill containment provisions include double-walled storage facilities and emergency cleanup procedures. The site would be sloped to direct any drainage from spill-prone areas (i.e., sludge loading) back to the treatment plant for processing.

Management of Stormwater Runoff Common to Operation of All Treatment Facilities

Stormwater generated in areas of the treatment plant site that could be exposed to wastewater and chemicals would be collected and processed through the treatment plant. Stormwater generated at parking lots and other general areas of the treatment plant site where no wastewater or solids are handled would be routed to biofiltration swales for treatment, and then infiltrated into the ground or directed to natural surface waters.

6.2.3 Discharge Alternatives: Impacts and Mitigation

6.2.3.1 Impacts and Mitigation at River Discharge

Construction Impacts at River Discharge

Construction of the river discharge would temporarily impact water quality with the disturbance of soils and release of sediments into the Snoqualmie River. Short-term increases in turbidity are expected, along with a potential decrease in dissolved oxygen levels in the river in the vicinity of the construction activities.

There are no wetlands mapped by the National Wetland Inventory or King County at the river discharge location. Construction of the discharge would occur within the 100-year floodplain and the floodway of the Snoqualmie River. As described in Chapter 3, the discharge pipe would be installed in the Snoqualmie River at the Carnation Farm Road Bridge. Construction activity along the shoreline could be expected to occur over an estimated one-month period. The discharge pipe would extend roughly 10 to 15 feet into the river and would be anchored on the river bottom.

Installation would require disruption of the bed and banks and possibly partial diversion of the Snoqualmie River around the discharge location. As described in Chapter 3, construction of the discharge would likely be accomplished using open-cut techniques for the on-shore portion. The pipeline would be constructed in an approximately 3-foot-wide trench (refer to Chapter 3 for further discussion). The in-water work would be accomplished in the shortest time possible and could be done using a number of different options including cofferdams, a barge, or a backhoe operated from shore. The appropriate construction methodology would be determined during final design and would comply with applicable permit requirements. In-water excavation related to construction of the discharge pipe is anticipated to be minimal. Some in-water work would be likely associated with pipeline anchoring. In-water work would result in resuspension of sediments in the water column.

Diversion of groundwater could be needed to dewater construction areas for the on-shore portion. Dewatering operations would comply with all appropriate discharge and treatment rules and regulations established by Ecology, and all appropriate construction BMPs would be implemented and maintained. Refer to the section in this chapter titled Impacts and Mitigation Common to All Treatment Facilities for further discussion.

Operation Impacts at River Discharge

The river discharge alternative could discharge an average flow of about 0.4 mgd, or approximately 0.6 cfs, of highly treated water into the Snoqualmie River. This input is small compared to the relative Snoqualmie River flows. Based on 73 years of record, the average Snoqualmie River flow at the proposed river discharge site is 3,738 cfs and the minimum discharge was 239 cfs. The small amount of highly treated water would be entrained into the

river current and diluted. Water quality standards and permit requirements for river discharge and the impacts of the discharge on the Snoqualmie River as a water resource are discussed below.

Operational impacts to groundwater quality are not anticipated because discharges to groundwater associated with the river outfall are not expected to occur.

Water Quality Standards for Operation of River Discharge

Municipal effluent discharges from a wastewater facility to a river outfall must receive an NPDES permit and a Water Quality Certification (401 Certification). Ecology bases the NPDES permit upon technology, water quality, and TMDL considerations.

Technology-based limitations are based on federal and state regulations that dictate maximum discharge limits for secondary treatment.

Water quality-based limitations are determined by Ecology based upon ambient river water quality. The regulations also establish criteria for toxic substances that could degrade the receiving water both in terms of aquatic life and for purposes of human health (WAC 173-201A and 173-221).

TMDL-based limitations were calculated by Ecology using a numerical model to establish maximum pollutant load discharges from point and non-point sources based on the TMDL study (Ecology, 1994). As described in the section in this chapter titled Total Maximum Daily Loads, TMDL parameters include BOD, ammonia-N, and fecal coliform bacteria; guidelines have also been established for soluble reactive phosphorus (SRP). Adherence to these discharge limits would maintain water quality in the Snoqualmie River system, particularly during low-flow periods (August to October).

Based on anticipated allowable mixing zones, dilution calculations were performed for the proposed Carnation treatment plant discharge (Carollo Engineers/Cosmopolitan Engineers, 2003). A mixing zone, as discussed early in this chapter, is a volume of receiving water where the mixing results in dilution of discharged water. Minimum dilution factors were then calculated based on the 7Q10 (7-day low flow with a 10-year recurrence interval) critical flow condition, determined to be 443 cfs by the TMDL study (Ecology, 1994). For the proposed river channel discharge area, dilution factors of 8.7 and 116 are allowed for the acute and chronic exposure levels, respectively (Carollo Engineers/Cosmopolitan Engineers, 2003). Dilution factors were calculated based upon a number of criteria including the river and discharge characteristics, and limitations of the acute and chronic water quality standards (WAC 173-201A) (Carollo Engineers/Cosmopolitan Engineers, 2003).

A summary of the resulting potential NPDES permit limitations for discharge to the Snoqualmie River, including dilution considerations, is listed in Table 6-3. These discharge limitations include dilution and would meet all applicable receiving water quality standards. As shown in Table 6-3, summer discharge limitations would occur for BOD_5, ammonia, and soluble reactive phosphorus.

Table 6–3. Potential NPDES Permit Limitations for Discharge to the Snoqualmie River, Carnation Treatment Facility

Parameter	Non-TMDL Season Limits (Nov. – July)		TMDL Season Limits (Aug. – Oct)	
	Average Monthly[1]	Average Weekly[1]	Average Monthly[1]	Average Weekly[1]
BOD_5[2]	30 mg/L, 155 lb/day	45 mg/L, 233 lb/day	30 mg/L, 25 lb/day, *4.5 mg/L* [3][4][5]	45 mg/L, 233 lb/day, *4.5 mg/L* [3][4][5]
TMDL Season Limit				
TSS [2]	30 mg/L, 155 lb/day	45 mg/L, 233 lb/day	30 mg/L, 155 lb/day	45 mg/L, 233 lb/day
Fecal Coliform Bacteria	200 colonies/ 100 mL	400 colonies/ 100 mL	200 colonies/ 100 mL	400 colonies/ 100 mL
pH	Daily min. ≥ 6 Daily max. ≤ 9	Same	Same	Same
Ammonia – N	40.1	95.6	40.1, *8.4 lb/day,' 1.5 mg/L* [3][4][5]	95.6, *8.4 lb/day,' 1.5 mg/L* [3][4][5]
TMDL Season Limit				
Total Residual Chlorine	0.063	0.165	0.063	0.165
Arsenic	2.14	3.13	2.14	3.13
Copper	0.025	0.036	0.025	0.036
Cyanide	0.131	0.191	0.131	0.191
Cadmium	0.005	0.007	0.005	0.007
Chromium (hex)	0.90	0.131	0.90	0.131
Chromium (tri)	1.05	1.53	1.05	1.53
Lead	0.050	0.073	0.050	0.073
Mercury	0.001	0.002	0.001	0.002
Nickel	2.61	3.81	2.61	3.81
Silver	0.002	0.003	0.002	0.003
Zinc	0.204	0.297	0.204	0.297
Soluble Reactive Phosphorus				
TMDL Season Limit			*3.0 lb./day, 0.5 mg/L* [3][4]	*3.0 lb./day, 0.5 mg/L* [3][4][5]

(1) The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken with the exception of fecal coliform bacteria, which is based on the geometric mean.
(2) The average monthly effluent concentration for BOD_5 and TSS shall not exceed 30 mg/L or 15 percent of the respective monthly average influent concentrations, whichever is more stringent.
(3) Daily maximum.
(4) Calculated based on a maximum daily flow of 0.66 mgd.
(5) Water quality concentration limit applies at all flows; mass limit applies at maximum day flow.
Source: Carollo, 2003b.

Water Quality Impacts for Operation of River Discharge

The potential impacts to water quality associated with wastewater discharge are generally related to temperature, bacteria and viruses, nutrients, turbidity, and chemical contamination. A discussion of how each of these could affect water quality in the Snoqualmie River follows. The effect of these water quality impacts on aquatic life, including salmon, is discussed in Chapter 7.

Temperature. Water temperatures can influence water quality. In general, warmer water temperatures in the summer months are of greatest concern. Ambient Snoqualmie River water temperature in the vicinity of Carnation ranges from approximately 49 to 69°F (approximately 9

to 21°C) during the summer (Ecology, 2004a). Because there is currently no centralized wastewater treatment in Carnation, the temperature of highly treated water leaving the proposed treatment facility cannot be forecast with certainty. Using other treatment plants in western Washington as a guideline, it is estimated that highly treated water would leave the plant at approximately 65 to 70°F (approximately 18 to 21°C) during the summer. Highly treated water leaving the Carnation treatment facility would travel for approximately 2.5 hours through the conveyance pipeline prior to being discharged to the Snoqualmie River. During this time it is estimated the water could be cooled by as much as 10°F (Carollo, 2004b). Conservatively assuming a temperature decrease of 5 degrees during conveyance to the discharge site, the warm-weather discharges to the river could range from approximately 60 to 65°F (approximately16 to 18°C).

The average flow of the Snoqualmie River in the vicinity of the river discharge site is 3,738 cfs (USGS, 2003). Very low water levels in rivers are characterized by the statistic known as 7Q10. The 7Q10 refers to the lowest consecutive 7-day streamflow that is likely to occur in a 10-year period. The Snoqualmie River 7Q10 flow in the vicinity of the river discharge is 443 cfs. The treatment plant would discharge an average of approximately 0.6 cfs into the river. The river and treatment plant water temperature estimates provided above, combined with the predicted cooling during travel to the outfall, indicate a minimal difference in temperature between the highly treated water and the receiving environment at the discharge point. The minimal temperature differential would not change the ambient river temperature beyond the mixing zone (less than 300 feet downstream of the outfall). Within the mixing zone, dilution of 0.6 cfs is expected to quickly reduce the temperature of the highly treated water to ambient conditions. The slight change in temperature within the mixing zone could affect water quality by slightly lowering dissolved oxygen levels (warmer water holds less dissolved oxygen than cooler water). However, temperature and dissolved oxygen are expected to be indistinguishable from ambient conditions beyond the mixing zone.

Bacteria and viruses. Bacteria and viruses live in the intestinal tracts of warm-blooded animals and are present in wastewater, surface water, and groundwater. Some pose a threat to human health. Fecal coliform bacteria are commonly tested for in surface and groundwaters as a general indicator of total bacteria and viruses. Ambient water quality data collected by King County in the Snoqualmie River as part of this project (Appendix A, Table A-8) indicate fecal coliform concentrations have ranged from 2 to 68 colonies per 100 milliliters (mL).

Table 6-3 provides anticipated NPDES permit limits for fecal coliform bacteria based upon preliminary calculations (Carollo Engineers/Cosmopolitan Engineers, 2003). Typically, fecal coliform bacteria concentrations are not measurable (less than 2 colonies per 100 mL) following MBR treatment and disinfection (Table 6-2). Therefore, bacteria levels in the receiving water following discharge of the highly treated water are expected to be indistinguishable from ambient conditions in the river.

Nutrients. Nutrients include nitrogen and phosphorus compounds that are essential for life. Nitrogen compounds play an important role in regulating algae growth. Excessive nutrient concentrations can promote algae growth, which in turn can deplete oxygen levels as the algae die, particularly during the summer months when sunlight is the highest and river flows and

dilution are the lowest. Low oxygen levels are limiting to salmonids and other cold-water fish, and in cases of extreme depletion, can result in fish mortality.

Table A-8 in Appendix A summarizes the nutrient concentrations measured in the Snoqualmie River between February 2003 and January 2004. Ambient concentrations of ammonia in the Snoqualmie River ranged from less than 0.01 to 0.017 mg/L, and orthophosphorus concentrations ranged from less than 0.002 to 0.0049 mg/L. Table 6-3 indicates the estimated NPDES permit limitation for ammonia and soluble reactive phosphorus (similar to orthophosphorus). Summertime maximum daily limits are estimated to be 1.5 mg/L for ammonia and 0.5 mg/l for soluble reactive phosphorus. Concentrations of ammonia remaining in highly treated water passing through the MBR process are less than 1 mg/L (Table 6-2). This level is below the estimated discharge limitations listed in Table 6-3. Concentrations of Total Phosphorus, soluble reactive phosphorus is a component of Total Phosphorus, during MBR pilot testing were <2 mg/L. It is possible that either chemical or biological treatment will be necessary to reduce phosphorus levels in highly treated water closer the ambient discharge conditions. Nutrients are expected to be indistinguishable from ambient conditions beyond the mixing zone.

Turbidity. Turbidity measured in the Snoqualmie River as part of this project ranged from 0.91 to 9.04 nephelometric turbidity units (NTU) between February 2003 and January 2004 (Appendix A, Table A-8). Elevated turbidity levels can be a concern for aquatic species (refer to Chapter 7 for further discussion). Elevated turbidity levels occur during the winter months associated with stormwater inputs. MBR treatment results in less than 1 NTU in highly treated water (Table 6-2). Therefore, turbidity is not anticipated to increase above ambient conditions as a result of the discharge of highly treated water into the river.

Chemical contaminants. Table A-8 in Appendix A summarizes the concentrations of metals measured in the Snoqualmie River as part of this project. Table 6-3 lists anticipated NPDES permit limitations for metals. Based upon the low level of industry within the Carnation service area and proposed pretreatment of industrial and commercial wastewater, metals concentrations are anticipated to meet NPDES discharge limitations. Metals, including copper, lead, and zinc, may be present in highly treated water. They do not break down and are considered persistent chemicals. In general, metals bind to sediment or particulates suspended in water, but they may also dissolve in water and accumulate in surface sediments or bioaccumulate in the tissues of aquatic life.

Organic chemicals may be either naturally occurring or human-made. In general, organic chemicals biodegrade over time to their component elements, although some persistent organic chemicals may not break down for decades. Organic chemicals include hydrocarbons and solvents present in household cleaners, for example. These compounds are frequently found at low levels in residential wastewater. Because they are not part of the typical residential waste stream, these compounds enter the system in small quantities associated with disposal of paint, cleaning materials, or automotive wastes. There are currently no surface water quality standards for these compounds. Biochemical oxygen demand (5-day) (BOD_5) can be used as an indicator for many of these chemicals. BOD_5 concentrations of less than 2 mg/L are anticipated in the highly treated water (Table 6-2); therefore, discharges of organic chemicals are expected to be minimal.

Water Quantity Impacts for Operation of River Discharge

The proposed river discharge would be located within the 100-year floodplain of the Snoqualmie River. All facets of this discharge system would be designed to withstand 100-year flows without damage to the facilities in accordance with FEMA requirements. Given the relatively small amount of highly treated water being discharged to the Snoqualmie River (an average of 0.6 cfs), no measurable impact on river water levels is anticipated.

Conclusion

As explained above, the combination of expected low concentrations of pollutants in highly treated water from the Carnation Wastewater Treatment Facility and rapid dilution when discharged to the Snoqualmie River are expected to result in no significant adverse impacts to ambient water quality and quantity.

Mitigation Measures for River Discharge Alternative

Compliance with permit conditions dictated by the NPDES and TMDL limitations would ensure that no significant impacts to surface water quality occur. The proposed MBR treatment technology provides a high level of removal for all regulated constituents. In addition to the mitigation measures common to all alternatives described in the section in this chapter titled Mitigation Measures Common to All Treatment Facilities, the following mitigation measures could be used to further minimize potential impacts to water resources:

- Routinely conduct water quality monitoring and reporting in the Snoqualmie River to ensure that the discharge of highly treated water meets or exceeds all water quality standards. This monitoring would occur prior to discharge and in the environment receiving the discharge. If permit standards are not being met, the plant operation would be assessed and if required, treatment would be augmented to remove additional pollutants to meet the standards.
- Design the discharge facility to prevent erosion and to minimize sediment buildup in the outfall. Monitor to assess sediment buildup and document any maintenance needs.
- For all in-water construction, comply with spill containment requirements. In the unlikely event that a construction accident or spill releases contaminants into waterways or the surrounding environment, construction BMPs (such as oil booms and absorbent pillows) would be employed and utilized to contain and minimize the spill.
- For all in-water construction activities, comply with the requirements of WDFW's Hydraulic Project Approval (HPA), the Corps permit, and King County sensitive areas permit conditions. Conditions of the HPA would likely limit construction to a specific window of time to protect fish and aquatic resources (refer to Chapter 7 for further discussion).
- Restoration after all in-water work will follow WDFW's Integrated Streambank Protection Guidelines.
- Develop an erosion prevention and sediment control plan and implement it in accordance with Ecology guidelines.

6.2.3.2 Impacts and Mitigation at Wetland Discharge

Under the wetland discharge alternative, highly treated water would be discharged into newly constructed or modified wetlands. There are two options associated with this alternative. First, the Basic Option would involve the construction of wetlands and the addition of highly treated water discharged to those wetlands and to an existing wetland (Figure 3-5). Second, the Expanded Option would include the features of the Basic Option in addition to the removal of an existing fish-passage barrier on the unnamed creek and installation of large woody debris structures at several locations (Figure 3-5). Refer to Chapter 3 for further discussion. Impacts and mitigation measures are similar for these two options as discussed below.

Construction Impacts at Wetland Discharge

Short-term impacts to water quality resulting from soil disturbance and suspension of sediments are likely to occur during construction activities. Test pits would be dug prior to finalizing the design for the wetland complex to help determine the final depth and shape of the wetlands. Excavation volumes have not been finalized but have been estimated based upon desirable wetland depths and habitat features. To construct seasonal wetlands, it is estimated that up to about 4,000 cubic yards could be excavated (Wilson, 2004). Short-term increases in turbidity in nearby surface waters are expected, along with a potential decrease in dissolved oxygen levels in the vicinity of the construction activities.

Under the Basic Option, highly treated water from the treatment facility would be piped to constructed and existing wetlands covering an estimated total of 6 to 8 acres. As shown in Figure 3-5, the pipe would be installed with branches delivering highly treated water to each of the constructed wetlands. Construction activities could result in short-term impacts to water quality as described in Construction Impacts Common to all Treatment Facilities above.

The Expanded Option would involve the installation of large woody debris (LWD) at several locations on the unnamed creek and connected oxbow, and possibly on Harris Creek (Figure 3-5). The LWD clusters would be semi-porous to emulate natural debris. The clusters would retain more water in the affected streams and wetlands than at present and retain it longer into the dry season for the purpose of enhancing wildlife habitat. The construction of the Expanded Option could result in short-term impacts to water quality in the wetland due to the disturbance of soil and suspension of sediments associated with the installation of the clusters. These impacts are anticipated to be minor because construction of the clusters would occur during the dry summer months, would be limited to a construction period of six to eight weeks, and would comply with all applicable permits for in-water work.

Construction-related impacts to groundwater are not anticipated because construction is anticipated to occur above the groundwater table.

Operation Impacts at Wetland Discharge

Under this alternative, an average flow of 0.4 mgd or approximately 0.6 cfs of highly treated water could be discharged into constructed and existing wetlands in the Stillwater Wildlife Area. Highly treated water would enter the wetlands by upwelling through cobbles and gravel

overlying the end of the pipe to mimic groundwater flow. Valves on the pipes would allow for controlled distribution of water to the wetlands. Discharge to the wetlands would be designed to mimic dynamic natural processes. Below is a discussion of how the discharge would meet permit and water quality standards followed by a discussion of the potential impacts of discharge. The purpose of the wetlands is not to provide additional "polishing" of the highly treated water being discharged to them; however, removal of some constituents may be an added benefit of the wetland discharge alternative.

Water Quality Standards for Operation of Wetland Discharge

Table 6-2 summarizes the anticipated water quality discharge requirements for the wetland discharge option. As mentioned above, compliance with the NPDES permit conditions would ensure that no significant impacts to surface water quality occur as a result of the discharge. The wetland discharge would also be required to meet Washington State Class A Reclaimed Water Standards. The reclaimed water standards have been developed for the purpose of preventing water quality impacts to the receiving water environment.

Water Quality Impacts for Operation of Wetland Discharge

The potential impacts of discharging highly treated water to receiving surface water quality are generally related to temperature, bacteria and viruses, nutrients, turbidity, and chemical contamination, and are similar to the impacts described above for the river discharge alternative. A discussion of how each of these parameters could affect water quality in both the receiving wetlands and adjacent surface water follows. Ambient water quality monitoring in the wetlands has not been conducted. The effects of these water quality impacts on aquatic life, including salmon, is discussed in Chapter 7.

Temperature. As stated for the river discharge alternative, highly treated water would leave the plant at approximately 65 to 70°F (approximately 18 to 21°C), depending upon the season, and is anticipated to cool as much as 10°F while traveling through the conveyance pipeline to the wetland discharge (Carollo, 2004b). Temperatures in the wetlands are expected to naturally fluctuate throughout the year because of the shallow depth and relatively stable quiescent conditions. Wetland water temperatures vary throughout the day as well as by season, depending upon solar radiation and the wetland characteristics. A shallow, surface flow wetland mimics the ambient air temperature cycle, a rooted aquatic system moderately fluctuates from the ambient air temperature cycle, and a subsurface flow wetland strongly fluctuates from the ambient air temperature cycle (Kadlec and Knight, 1996).

Because the proposed discharge method involves introduction of flow through the subsurface, it is expected that water temperatures may be lower than air temperatures. Still, temperatures could reach 65°F (approximately 18°C) or higher during summer months because the temperature of the highly treated water would be roughly within this range.

A minimal difference in temperature between the highly treated water and the wetland environment could occur. The highly treated water could be slightly cooler or warmer than the receiving wetlands depending upon the time of year. The 0.6 cfs of highly treated water being

discharged is expected to disperse into the wetland areas. Any cooling of the wetland waters that may occur during the summer months has the potential to improve water quality by slightly increasing dissolved oxygen levels in the wetland. Any warming of the wetland waters that may occur during winter months could affect water quality by slightly decreasing dissolved oxygen levels in the wetland. These effects are not expected to substantially modify conditions in the wetlands because the surface area of the wetland would disperse the highly treated water. Water temperature in the receiving surface water bodies is expected to be indistinguishable from ambient conditions as a result of the wetland discharge.

Bacteria and viruses. Impacts from bacteria and viruses would be similar to those described for the river discharge alternative. Discharge of highly treated water to the wetlands is not anticipated to increase bacteria levels above ambient conditions. Ambient sources of bacteria in the wetlands include waterfowl, wildlife, and inputs from natural flow sources. Introduction of highly treated water to the wetland system could result in a reduction of bacteria in receiving surface water bodies.

Nutrients. Impacts from nutrients would be similar to those described for the river discharge alternative above. Vegetation in the wetland system would remove nutrients from the water column; however, nutrients are released back into the water column when plants die. Overall, conditions in the wetland would be very similar to a natural wetland system, with fluctuating nutrient levels according to seasonal variations in wetland biota.

Turbidity. Impacts from turbidity would be similar to those described for the river discharge alternative above. Turbidity is not anticipated to increase above what would naturally occur within a wetland system.

Chemical contaminants. Impacts from metals and organics would be similar to those described for the river discharge alternative above. Wetland plants could provide some uptake of residual metals in the discharge water. Wetland plants also slow the movement of water through the wetland system and provide the potential for increased deposition of solids and contaminants adsorbed to the solid particles.

Water Quantity Impacts for Operation of Wetland Discharge

The proposed wetland systems would be located within the 100-year floodplain of the Snoqualmie River. All facets of this discharge system would be designed to withstand 100-year flows without damage to the facilities or reduction in effective floodplain storage volume in accordance with FEMA requirements.

As described in Chapter 3, highly treated water would be discharged to wetlands via upwelling though cobbles and gravel. Highly treated water introduced to these wetland systems would not be the only source of water but would make up a greater percentage during the drier summer months. This would likely have the desired effect of providing inundation of the wetlands year-round.

Highly treated water discharged to the wetlands would either flow overland to adjacent surface waters or infiltrate into groundwater. Adjacent surface waters that could receive waters from the

wetlands include the unnamed creek located south and west of the wetlands or the oxbow located north and west of the wetlands. Surface swales or control structures would be constructed to allow water to flow from the wetlands into either the unnamed creek or the oxbow. The oxbow drains to the creek, which drains to the Snoqualmie River. Discharge-related impacts on water levels, erosion, and sedimentation are not expected to be significant because during normal operating conditions, the wetlands would provide flow-moderating effects as well as allowing sediment deposition.

Operational impacts to groundwater are not anticipated due to the limited interaction between surface/subsurface water and groundwater in the proposed wetland discharge area resulting from a silt and clay layer separating the two. This layer extends about ten feet down from the surface. (Carollo, 2004b).

Conclusion

As explained above, the combination of low concentrations of pollutants in highly treated water from the Carnation Wastewater Treatment Facility and the natural tendency of wetlands to attenuate pollutants and water flow are expected to result in no significant adverse affects to ambient ground or surface water quality and quantity.

Mitigation Measures for Wetland Discharge Alternative

See the section in this chapter titled Measures Common to All Treatment Facilities. In addition the following mitigation measures could be used to minimize potential impacts to water resources:

- Comply with all in-water construction activity requirements of WDFW's Hydraulic Project Approval (HPA), Corps 404 permit, and King County sensitive areas permit conditions.
- Comply with the NPDES permit conditions to ensure that no significant impacts to surface water quality occur.
- Comply with WDFW wetland restoration policies and guidelines.
- Conduct water quality monitoring to verify that the discharge of highly treated water meets or exceeds all water quality standards.
- Plant native wetland and riparian species in the wetlands in the areas surrounding the discharge.
- Design the pipeline in the wetlands to prevent erosion and to minimize sediment buildup in the wetland systems. Monitor sediment buildup and document any maintenance needs.

6.2.3.3 Impacts and Mitigation at Upland Discharge

The upland discharge alternative would consist of discharging highly treated water into constructed infiltration basins that would allow the water to percolate into the ground beneath the basins. The water would filter through the soil and eventually mix with groundwater. As a component of groundwater, a portion of the infiltrated water could enter surface waters that flow

to the Snoqualmie River. Approximately eight basins would be constructed by excavating and erecting low earthen dikes around half-acre infiltration areas (Figure 3-6). One or two basins would be used at a time. Overflow facilities would be installed in each basin to direct any flows in excess of hydraulic capacity to an adjacent infiltration basin.

Construction Impacts at Upland Discharge

Construction of an upland discharge system could temporarily impact surface water quality with release of sediments into downstream drainages during construction activities. Major construction activities for the upland infiltration basins are estimated to occur over a period of approximately four months. As with any construction project, leaks or spills from construction equipment could occur. Diversion of surface or groundwater from dewatering could also occur, temporarily lowering the groundwater table in the area. These impacts would be short-term and could be minimized by implementing the mitigation measures described in the section in this chapter titled Impacts and Mitigation Common to All Treatment Facilities.

Operation Impacts at Upland Discharge

Access to the upland discharge study area was limited, so site-specific information was not available at the time of this writing. General conditions of the upland discharge study area were obtained from field investigations conducted at the City-owned landfill property located immediately adjacent to the upland study area and from published information (Carollo, 2004a). Three field investigations were conducted on the City-owned landfill property to examine the surface geology and soils; monitor well drilling and testing; and water level monitoring. Soils and water samples were taken during the field investigations and sent to laboratories for analysis. In addition to the field investigations, well log records from the Washington State Department of Ecology were reviewed. Four of the 18 wells reviewed were determined to be sufficiently close to the upland discharge study area that they could be used to further characterize soils and geology in the area. Using this data the feasibility and potential impacts are discussed below.

Impacts to surface water quality associated with operation of the upland discharge are not anticipated. All highly treated water would be infiltrated; however, because the quality of the water would be so high following treatment, there would be minimal impacts to surface waters from inadvertent releases.

Groundwater Quantity Impacts for Operation of Upland Discharge

Groundwater mounding is perhaps the most substantial impact that can occur beneath an infiltration basin (Carollo, 2004a). Groundwater mounding occurs when the infiltrating water backs up instead of continuing to drain downward. The mounded water stays at a shallow depth in the soil. In some cases the mounded groundwater may even show up as wet areas on the surface of the ground, which is then called groundwater flooding. Mounding or “pooling” is a function of basin size and shape, infiltration rate, length of application, aquifer permeability and effective porosity, the preapplication water level in the aquifer, and the permeability of restricting layers impeding vertical flow.

Information from field studies conducted at the City-owned landfill site and analysis of well logs on adjacent properties as part of this project indicates that the shallow aquifer is much less permeable than the geologic materials found at the surface. Mounding calculations indicate that with such a low permeability, the water table would mound and would, under proposed application rates, become totally saturated. This would raise the water table surface and could cause localized flooding (Carollo, 2004a).

For an infiltration basin to drain properly, a minimum of 2 feet is required between the bottom of the basin and the top of the groundwater mound. The 5 feet of material (gravel) at the surface on the City's landfill property that was investigated as part of this study is too thin to properly allow for infiltration. It is likely that gravel would need to consistently be 15 feet thick or more across an application area for infiltration to be feasible. Additional site-specific investigation would be required to determine if the soils would have a sufficient thickness of material (gravel) to support infiltration and this disposal option (Carollo, 2004a).

Groundwater Quality Impacts for Operation of Upland Discharge

The potential impacts to groundwater quality associated with wastewater discharge are generally related to bacteria and viruses, nutrients, and chemical contamination, and are similar to those described earlier for the river discharge alternative. Surface infiltration of wastewater provides additional treatment beyond that achieved in the treatment plant. Improvements in removals of suspended solids, bacteria and viruses, nitrogen/nitrate, phosphorus, some chemicals (including metals), and other constituents have been documented at sites utilizing surface infiltration as a disposal method (Carollo, 2004a). The potential impacts of any remaining pollutants on groundwater quality are discussed below.

Discharges of highly treated water to groundwater would be required to meet the groundwater standards (Table 6-2). Groundwater standards have been developed to protect groundwater resources that are used as drinking water supplies.

Temperature is of less concern for groundwater because of the natural cooling process that occurs through infiltration. Ambient groundwater quality monitoring has not yet been conducted but would be conducted prior to implementing an upland discharge program.

As stated for the river discharge alternative, highly treated water would leave the plant at approximately 60 to 70^{o}F (approximately19 to 21^{o}C), depending upon the season, and is anticipated to cool by as much as 10^{o}F while traveling through the conveyance pipeline to the discharge site (Carollo, 2004b). Ambient groundwater temperatures in the Pacific Northwest are in the vicinity of 50^{o}F (10^{o}C); however, the dilution of discharged flows by ambient groundwater would minimize any effects to groundwater.

Impacts to groundwater from bacteria, viruses, metals, and organic chemicals would be similar to those described for the river discharge alternative. Discharge of highly treated water to groundwater is not anticipated to increase levels of these constituents above ambient conditions. See additional discussion in Chapter 10.

If upland discharge is determined to be feasible, the highly treated water would need to meet the water quality requirements listed in Table 6-2 at the point of discharge. As an added benefit, highly treated water would undergo additional treatment as it percolated through the soil, resulting in further improvement in quality for some parameters. Eventually the infiltrated water would mix with native groundwater. Prior to discharge to the infiltration basins, the highly treated water would meet groundwater quality standards and should be very similar to the quality of the existing groundwater; therefore, the impact to groundwater quality is expected to be minor.

Conclusion

The subsurface conditions and hydrogeology of the upland discharge study area have been established through field investigations and other analysis of adjacent properties; therefore, a level of uncertainty exists. Given this uncertainty, the impacts stated above, including the potential significant impacts associated with groundwater mounding, represent a conservative, worst case scenario.

Mitigation Measures for Upland Discharge Alternative

See the section in this chapter titled Impacts and Mitigation Common to All Treatment Facilities. In addition the following measures could be used to minimize impacts to groundwater resources:

- Comply with groundwater recharge requirements to ensure that no significant impacts to groundwater quality occur. Water quality monitoring and reporting would be conducted in order to verify that the discharge of highly treated water met or exceeded all applicable water quality standards. This monitoring would occur prior to discharge and in the environment receiving the discharge.
- Prepare a groundwater monitoring plan prior to implementation of this discharge alternative. Install and monitor groundwater monitoring wells in accordance with the provisions of the plan.

6.2.5 No Action Alternative

Under the No Action Alternative, there would be no construction of the proposed treatment facility and none of the impacts associated with the facility would occur. Wastewater in Carnation would continue to be disposed of through on-site septic systems. Risk to surface and groundwater quality would continue at present or increased levels as aging systems continued to fail.

A majority of the existing development in Carnation occurred prior to health department jurisdiction over the use of on-site septic systems. The probability that on-site septic systems will fail appears to be relatively high in much of Carnation due to the nature of the criteria under which most of the existing systems were designed and the age of the systems.

The Public Health-Seattle & King County Department of (PHSKC) code considers disposal-only methods such as cesspools, seepage pits, and pit privies as examples of failing on-site septic systems. These types of on-site systems are open-bottom manholes that provide minimal treatment prior to discharge to the ground (other terms used for these types of systems are sumps or drywells). The lack of treatment creates the potential for nitrate, bacteria, and viruses to enter the groundwater. Once in the groundwater, these pollutants can flow to surface waters.

The PHSKC has estimated that approximately 50 percent of the disposal systems within the City of Carnation involve the use of sumps or drywells (Adolfson, 1990). In 1987 the PHSKC declared a public health hazard area based on the number of inadequately treating septic systems and likely contamination of the unprotected aquifer from which drinking water is provided. A recent PHSKC letter stated, “Since this 1987 declaration little has changed in regards to the disposal-only septic systems and their potential to contaminate ground water” (Bishop, 2003). A recent letter from the City of Carnation stated, “Not only will the approximate 50% of old systems continue to fail, many of the newer systems also could fail, due to improper use and/or failing drain fields or lack of reserve areas. Also, most of these newer systems do not fall under the Seattle/King County Health Department's current on-site septic requirements which increase their susceptibility for ground water contamination” (Brandon 2004).

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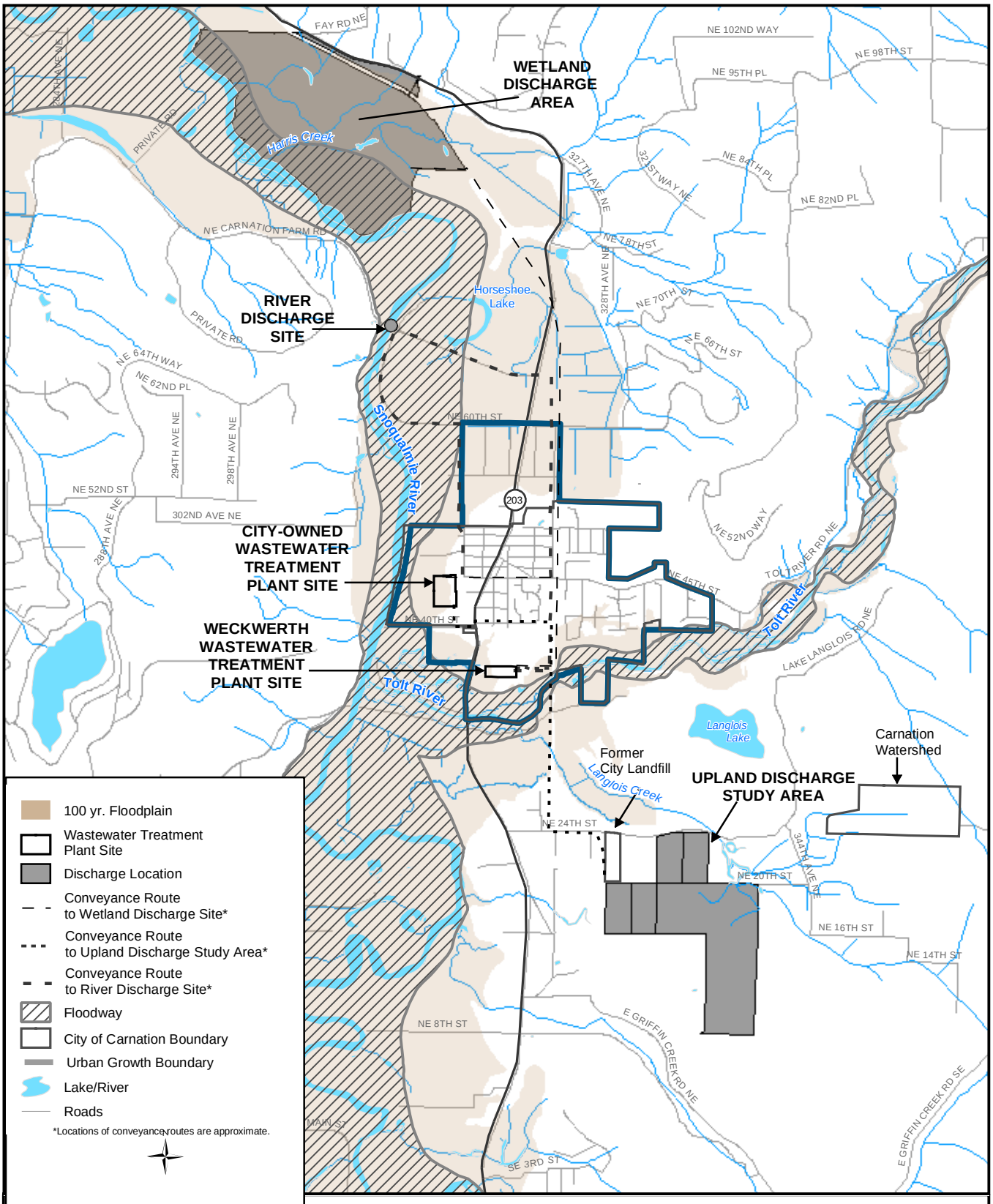

Figure 6-1

Surface Water Bodies and Floodplains

CARNATION WASTEWATER TREATMENT FACILITY FINAL EIS

King County
Department of
Natural Resources and Parks
Wastewater Treatment Division

Data Sources: King County GIS, 2003 **File Name:** L:\ENVIR IMPACTS\2003 Projects\23016 Carnation WWTP\GIS\Surfacewater&Floodplains.mxd 06/01/2004 cm **Prepared by:** King County WLR Visual Communications & Web Unit

Chapter 7
Biological Resources

Only sections or other elements of Chapter 7 revised for the Final EIS are included here. These changed sections combined with the unchanged sections of Chapter 7 in the Draft EIS constitute Chapter 7 of the Final EIS. Please see the introduction to the "Changes Made in the Draft EIS in Response to Comments" section for a full explanation.

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7.1.3.1 City-owned Site: Existing Conditions

Existing Habitats and Associated Wildlife at City-owned Site

The City-owned site is mostly vacant and consists of upland grassland habitat. Vegetation on the site, which is periodically mowed, is dominated by tall fescue and thistle with patches of Himalayan blackberry. A few small trees are located at the northern boundary of the site. Wildlife species associated with this type of habitat are listed in Table B-2 (Appendix B).

The City-owned site is bounded by underdeveloped residentially zoned land to the north, undeveloped land (a scrub-shrub field) to the west, ballparks and commercial lots to the southwest, commercial and residential development to the south, and residential and commercial development to the east.

No federally or state-listed special-status species or priority habitats have been mapped by the federal government or WDFW within the boundaries of the City-owned site. The site is more than 1 mile from the documented occurrences of special-status bird species listed in Table 7-3. The site is within a larger general area where bog clubmoss, a state sensitive species, has previously been documented. Mapped priority habitats (riparian areas and wetlands associated with the Snoqualmie River) are located off-site to the west. Wetlands and streams are further discussed in the following sections.

7.2.2.2 Impacts at Wetland Discharge

Construction Impacts at Wetland Discharge

Construction impacts are similar to those discussed above for the river discharge alternative. Special-status species (bald eagle, great blue heron, and bog clubmoss) have also been documented within 1 mile of the wetland discharge site (see Table 7-3) as discussed for the river discharge.

Operation Impacts at Wetland Discharge

Because of the safeguards built into the design of the treatment facility and the possibility to monitor and adjust the flow of water to the discharge wetlands, impacts from implementation of either the Basic or Expanded Option for the wetland discharge are not likely to be significant. See the section earlier in this chapter titled Impacts at River Discharge for potential impacts of nutrients, metals, and elevated temperature on biological resources.

As discussed in the Water Quality Impacts for Operation of Wetland Discharge Section of Chapter 6, it is anticipated that a minimal difference in temperature between the highly treated water and the wetland environment could occur. The highly treated water could be slightly cooler or warmer than the receiving wetlands depending upon the time of year. The highly treated water being discharged to the wetland is expected to disperse into the wetland areas. Any cooling of the wetland waters that may occur during the summer months has the potential to improve water quality by slightly increasing dissolved oxygen levels in the wetland. Any warming of the wetland waters that may occur during winter months could affect water quality by slightly decreasing dissolved oxygen levels in the wetland. This temperature difference is not anticipated to have adverse impacts on biological resources associated with the wetland discharge site.

Basic Wetland Discharge Option

Beneficial effects from the introduction of highly treated water to discharge wetlands in the Stillwater Wildlife Area under the Basic Option could include providing greater water depth and an extended period of inundation to the existing forested wetland and wetlands that would be constructed. Increased depth of water and increased duration and extent of inundation could provide additional habitat for waterfowl and other species that depend on open water habitat. However, if the water level in these depressions draws down in middle to late summer, then reed canarygrass could be encouraged (Antieau, 2001).

Increasing the depth and extent of inundation in the existing forested wetland could lead to loss of forested wetland habitat if flood durations exceed the flood tolerance limits of the existing tree species. The relative quantities of water directed to the three discharge wetlands could be adjusted to direct less water to the forested wetland if necessary.

Increasing the extent of open water wetland habitat would provide greater opportunities for wildlife species that are "closely associated" and "generally associated" with open water wetland and emergent wetland habitats. Decreasing the extent of forested wetland habitat could have a detrimental effect on wildlife species that are "closely associated" with forested wetland and riparian habitat. These terms are defined as follows:

- **Closely Associated**: A species is widely known to depend on a habitat for part of all of its life history requirements.
- **Generally Associated**: A species exhibits a high degree of adaptability and may be supported by a number of habitats.

See Table B-2 for list of species likely to occur in the project area and their associated habitat types.

The discharge wetlands would have essentially no erosive condition. With periodic deposition from flood events this could result in a tendency to fill in the wetlands over a long period of time (Carollo, 2004b). If this were to occur, the wetlands could cease to provide open water habitat. However, periodic flooding does have erosive action, which could moderate the deposition activity. The potential detrimental effects of wetland sedimentation could be countered by monitoring and adaptively managing their operation.

Expanded Wetland Discharge Option

The Expanded Option would include all elements of the Basic Option as well as placement of large woody debris structures on Harris Creek and/or at several locations in the unnamed creek and connected oxbow, as well as the removal of a fish-passage barrier located on the unnamed creek.

In addition to the effects described above for the Basic Option, implementation of the Expanded Option could increase the water levels in Harris Creek and/or the unnamed creek upstream of the log structures, and increase the extent and duration of inundation in riparian wetlands associated with Harris Creek and/or the unnamed creek. The structures would hold water during the wet season, when the Stillwater Wildlife Area is already saturated, and into the late spring or early summer. The habitat benefits would occur mainly between May and October when surface water levels are typically the lowest. These benefits could include enhanced off-channel rearing habitat for Chinook and coho salmon in the Snoqualmie River.

Increased depth of water and increased extent of inundation in the riparian wetlands could reduce the overall cover of non-native reed canarygrass by exceeding the flood tolerance limits of this species. Decreasing the extent of reed canarygrass, combined with the planting of native shrub and emergent species, is likely to result in greater variety of native habitat conditions. An increase in habitat diversity is likely to increase native wildlife species diversity within the project area, particularly for waterfowl, for whom seed-producing vegetation is important and which depend upon open water habitat for breeding, nesting, and feeding (Ehrlich et al., 1988).

However, it is also possible that changes in the current patterns of inundation and drawdown of water in the discharge wetlands could result in increased cover of non-native, invasive plant species such as reed canarygrass. However, with monitoring and adaptive management incorporated into the proposal these potential impacts would be mitigated.

Increasing the depth and extent of inundation in the existing 5-acre wetland located next to the trail could also lead to loss of forested wetland habitat if flood durations exceed the flood tolerance limits of the existing tree species. Loss of forested wetland habitat could be considered a significant impact because of the relatively small amount of such habitat that currently exists in the Stillwater Wildlife Area. However, with monitoring and adaptive management incorporated into the proposal, these potential impacts would be mitigated.

Removing the fish-passage barrier at the mouth of the unnamed creek would open new off-channel habitat for salmonids. During periods of high flows within the mainstem Snoqualmie River, juvenile salmonids would likely seek refuge within these types of off-channel habitats. However, creating this type of habitat could also promote the use of these habitats by invasive species, which often prey upon juvenile salmonids (Haring, 2002).

Endocrine Disrupting Chemicals

See the earlier discussion in the river discharge alternative for potential issues related to endocrine disrupting compounds.

Chapter 9
Land and Shoreline Use

Only sections or other elements of Chapter 9 revised for the Final EIS are included here. These changed sections combined with the unchanged sections of Chapter 9 in the Draft EIS constitute Chapter 9 of the Final EIS. Please see the introduction to the "Changes Made in the Draft EIS in Response to Comments" section for a full explanation.

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9.1.2 Existing Conditions at Treatment Plant Sites

9.1.2.1 City-owned Site: Existing Conditions

The City-owned site is located southwest of the most populated areas of Carnation in a mixed residential, commercial, and industrial area west of the main downtown thoroughfare. The site is largely vacant and undeveloped. There are two structures in the northeast corner of the site: a single-family residence and outbuilding. The house is leased to the Snoqualmie Tribe. The outbuilding, a large barn-like structure, is currently being used by the City as a shop/garage. The City's Comprehensive Plan designation for the site is Light Industrial/Manufacturing.

The site and three adjacent properties to the east and two properties to the south are zoned Light Industrial/Manufacturing (LI/M). The LI/M zone is established primarily to accommodate enterprises engaged in the manufacturing, processing, repairing, or assembling of goods, merchandise, or equipment. Property to the south is zoned Multi-Family Residential (MFR) and is currently occupied by a single-family residence.

The adjacent properties to the north and west are zoned Residential–Agriculture (RA) and Urban Residential Single-Family (UR7.5). The RA designation is intended to accommodate single-family residential uses and a wide variety of agricultural and agricultural support uses including commercial agriculture, truck gardening, nurseries, animal kennels and clinics, and small-scale livestock production. The UR7.5 designation supports single-family detached residential uses at low to medium densities in areas served by public utilities and services. The property to the north is currently occupied by a single-family residence and agricultural use. The property to the west is Tolt MacDonald Park, a King County facility.

Within 200 feet east of the proposed treatment plant site are Mixed Use (MU) and Central Business District (CBD) zones occupied by downtown business and residential uses. A single-family residential area is also located within 500 feet to the northeast.

King County GIS data indicate that the City-owned site is partially within the Snoqualmie River 100-year floodplain (see Figure 6-1 and Chapter 6 for further details). These data are approximate. Detailed surveys have not been conducted, and FEMA floodplain studies are under revision. Any facility constructed on this site would comply with FEMA and Carnation development regulations.

If any of the treatment plant structures were to be located within the floodplain, City of Carnation regulations would require that portion of the site to be elevated. Chapter 15.64 of the Carnation Municipal Code regulates development in Special Flood Hazard Areas (SFHA) (i.e., 100-year floodplains and floodways). See the discussion titled Relevant Regulations for additional details.

The City of Carnation Shoreline Management jurisdiction extends to the Snoqualmie River 100-year floodplain limit. If any portion of the treatment plant were constructed in the 100-year floodplain a substantial shoreline development permit would be required.

9.1.2.2 Weckwerth Site: Existing Conditions

The Weckwerth site currently serves as a vehicle and equipment storage area for a specialty concrete fabrication facility (Custom Concrete Castings) located immediately to the east of the site. A house is also located on the site at the western corner. The site is located south of the most populated areas of Carnation. The City's Comprehensive Plan designation for the site is Light Industrial/Manufacturing. The Weckwerth site and adjacent properties to the south and east are zoned Light Industrial/Manufacturing (LI/M). The LI/M zoned properties adjacent to the site are occupied by a fire station on the west and vacant property to the south.

The LI/M zoned property north of the site is a narrow (less than 100 feet) access drive serving Custom Concrete to the east. This drive would also provide access to the treatment plant site via an easement. The properties to the north are occupied by the Tolt Middle School and athletic facilities with underlying zoning of Urban Residential Single-Family (UR7.5). The property to the southwest of the site is zoned Employment/Office (E/O) and is mostly vacant. The E/O zone is designed to accommodate a variety of professional office and employment activities such as a business park or office buildings.

King County GIS data indicate that approximately 20 percent (approximately 1.5 acres) of the Weckwerth site is located in the 100-year floodplain associated with the confluence of the Tolt and Snoqualmie Rivers (see Figure 6-1 and Chapter 6 for further details). No part of the site is located within the Tolt or Snoqualmie River floodway.

If any part of the treatment plant structures were to be located within the floodplain, City of Carnation regulations would require that part of the site to be elevated. Chapter 15.64 of the Carnation Municipal Code regulates development in Special Flood Hazard Areas (SFHA) (i.e., 100-year floodplains and floodways). See the discussion above on relevant regulations for additional details.

As discussed earlier in this chapter, the King County Shoreline Master Program is being applied to the Tolt River. The King County Shoreline Master Program jurisdiction extends to the 100-year floodplain limit. If any portion of the treatment plant were constructed in the 100-year floodplain King County Shoreline Management regulations would apply.

9.1.3.1 River Discharge: Existing Conditions

The river discharge site is located adjacent and on either side of the eastern approach to the Carnation Farm Road Bridge in unincorporated King County. The site is located in King County right-of-way. The adjacent properties are designated Agricultural (ag) in the King County Comprehensive Plan and zoned Agricultural with a 35-acre minimum lot size (A-35). The purpose of the Agricultural zone (A) is to preserve and protect irreplaceable and limited supplies of farmland well suited to agricultural uses by their location, geological formation, and chemical and organic composition and to encourage environmentally sound agricultural production. The A zone accomplishes this through limitations on residential uses and density, and limitations on non-agricultural uses.

Numerous other County designations apply to the site, particularly those related to sensitive or critical areas. The Snoqualmie River is designated as a wildlife network and an area of Chinook salmon distribution. The site has stream and seismic designations under the King County Sensitive Areas Map Folio. The river discharge alternative is also located within King County Flood Hazard Area. The site is also within a King County Agricultural Production District, specifically the Snoqualmie River Valley Agricultural Production District.

The King County Shoreline Management designation for the site is Conservancy. This designation is typically assigned to areas primarily free from intensive development.

9.1.3.2 Wetland Discharge: Existing Conditions

The wetland discharge area is located in the Washington Department of Fish and Wildlife's Stillwater Wildlife Area, in unincorporated King County. The site is designated Agricultural (ag) in the King County Comprehensive Plan and zoned Agricultural with a 35-acre minimum lot size (A-35). The site is also within a King County Agricultural Production District, specifically the Snoqualmie River Valley Agricultural Production District. The areas proposed for wetland discharge may have been in agricultural production in the past. However, cropping history for the Stillwater Wildlife Area remains unknown at this time.

Numerous County critical area designations apply to the site. The Snoqualmie River is designated as a wildlife network and an area of Chinook salmon distribution. The site has wetland, stream, seismic and flood hazard Sensitive Areas Map Folio designations. The wetland discharge site is also within the King County Flood Hazard Area.

The King County Shoreline Management designation for the site is Conservancy.

9.2.1 Treatment Plant Alternatives: Impacts and Mitigation

9.2.1.1 Impacts at City-owned Site

According to the Carnation Municipal Code Section 15.16.090 and Table 15.40, a wastewater treatment facility is an allowed use in the LI/M zone. No zoning changes would be required. While the siting of a treatment plant at this location could be considered a displacement of industrial/manufacturing use of the property, the buildable lands analysis indicates adequate capacity of commercial/industrial land for the City to meet its job targets under GMA. Treatment plants are also a permitted use in the LI/M zone. A single-family house and outbuilding occupy the northeast corner of the site. It is possible that this portion of the site may be needed for construction of the treatment plant. Should the land be needed, the house, currently leased to the Snoqualmie Tribe, and the outbuilding, currently used as a garage/shop by the city, would be displaced. King County would follow applicable relocation policies and regulations.

There is potential for floodplain and shoreline impacts (see Chapter 6 for details on impacts). Until a site-specific survey is conducted, the actual extent of floodplain and shoreline impacts remains unknown. No other environmentally sensitive areas would be affected.

Construction impacts to property owners and businesses are discussed in Chapters 5, 10, and 12.

No long-term adverse land use impacts are anticipated at or in the vicinity of the treatment plant site.

9.2.1.2 Impacts at Weckwerth Site

A wastewater treatment facility is an allowed use in the LI/M zone (CMC 15.16.090 and Table 15.40). No zoning changes would be required. While the siting of a treatment plant at this location could be considered a displacement of industrial/ manufacturing use of the property, the buildable lands analysis indicates adequate capacity of commercial/industrial land for the City to meet its job targets under GMA. Conceptual layouts of the facility indicate that the treatment plant would not preclude use of the existing house at the western corner of the site, although its proximity to the facility may not be desirable as a residence.

There is potential for floodplain and shoreline impacts (see Chapter 6 for details on impacts). Until a site-specific survey is conducted, the actual extent of floodplain and shoreline impacts remains unknown. No other environmentally sensitive areas would be affected.

Construction impacts to property owners and businesses are discussed in Chapters 5, 10, and 12.

No long-term adverse land use impacts are anticipated at or in the vicinity of the treatment plant site.

Chapter 10
Environmental Health

Only sections or other elements of Chapter 10 revised for the Final EIS are included here. These changed sections combined with the unchanged sections of Chapter 10 in the Draft EIS constitute Chapter 10 of the Final EIS. Please see the introduction to the "Changes Made in the Draft EIS in Response to Comments" section for a full explanation.

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10.2.1 Impacts and Mitigation Common to All Treatment Facilities and Treatment Plant Alternatives

Construction Impacts Common to All Treatment Facilities

Environmental health risks during construction center around noise and the potential for encountering contaminated soils. These risks would be similar for all treatment facilities and typical for these types of structures. Individuals immediately adjacent to construction could be affected, but impacts would be localized, short-term, and temporary. Because potential risks would be minimized through construction plans and construction best management practices (BMPs), these impacts would not be expected to be significant to the general community. Impacts specific to each treatment plant site alternative are highlighted in this section where appropriate.

Construction Noise Impacts Common to All Treatment Facilities

Because impacts from noise during construction of the treatment facility would be short-term and temporary, they are not expected to be significant. During construction, there would be a temporary increase in sound levels in the immediate vicinity of the activity and along local haul routes due to the use of heavy equipment and the hauling of construction materials. Construction-related noise could be expected throughout the construction period but would vary in intensity over that period depending on the phase of construction and specific activities. The duration of major construction activities expected to occur for each of the components of the treatment system is as follows:

- Treatment Plant – 18 to 24 months
- River Discharge – 1 month
- Wetland Discharge – Basic Option, 2 to 4 weeks; Expanded Option, 6 to 8 weeks
- Upland Discharge – 4 months
- Conveyance – 2 to 4 months

It is expected that the greatest amount of noise would be produced during the earth moving and excavation phases of construction, when heavy equipment (dozers, backhoes, etc.) and heavy trucks would be used. Diesel-powered construction equipment typically makes more noise than gasoline-powered vehicles. The low frequency of diesel engines travels farther and can impact older homes with single-pane windows and less insulation.

Full-time dewatering at the treatment plant construction site may be required for a portion of the construction period (up to approximately four months). If dewatering is required, portable generators to power pumps could be used and would operate during nighttime hours.

The remainder of the construction period for the treatment plant would consist of building construction, paving, and landscaping. Noise sources during this period of construction would include worker vehicle engines; heavy trucks delivering construction materials; small equipment such as drills, saws, and hammers; and worker voices. Occupants of adjacent properties and motorists on adjacent roadways would unavoidably be exposed to construction noise.

Table 10-2 shows unmitigated maximum noise levels from commonly used construction equipment. At distances beyond 50 feet, these maximum noise levels would be reduced by 5 to 7 dBA for each doubling of the distance between the noise source and the receiver. For example, a hydraulic backhoe excavator of 7-cubic-yard capacity and 760 horsepower could generate noise levels of 79 to 85 dBA at a distance of 100 feet. The actual noise reduction would depend on effects of terrain and line-of-sight barriers such as berms, retaining walls, opaque fences, and buildings.

Table 10–2. Expected Construction Equipment and Maximum Noise Levels

Type of Equipment	Rating or Capacity	Engine Size (Horsepower)	Range of Maximum Sound Level at 50 feet (dBA)
Crawler tractor / dozer	101 to 250 hp	101 to 250	81 to 85
	251 to 700 hp	251 to 700	85 to 90
Front end loader	2-1/4 to 5 cu yd	116 to 299	82 to 86
	6 to 15 cu yd	300 to 750	86 to 90
Hydraulic backhoe excavator	1-1/2 to 3 cu yd	131 to 335	82 to 86
	3-1/4 to 7 cu yd	336 to 760	86 to 90
Grader	9 to 16 ft blade	60 to 350	79 to 86
Mobile crane	11 to 75 ton at 10 ft boom	121 to 240	82 to 85
Pile driver (impact)	not specified	not specified	101
Pile driver (sonic)	not specified	not specified	96
Portable air compressor	400 to 2000 cfm at 100 psi	126 to 600	82 to 89
Trucks	100 to 400 hp	100 to 400	81 to 87

Source: Bolt, Beranek, and Newman, Inc. (1981)

The construction noise impacts specific to each treatment plant site are as follows:

City-owned Site. Occupants of nearby residential properties to the north and west of the City-owned site and motorists on adjacent roadways (Entwistle Street) would unavoidably be exposed to construction noise. Businesses and residences located two to three blocks away from the project area could also be temporarily impacted by demolition and construction activities, engine noise, and backup alarms, but noise levels would gradually diminish with increasing distance from the construction activity.

Weckwerth Site. Truck traffic and site work during construction would result in temporary noise impacts to students and employees of Tolt Middle School, residents of the existing house, employees of the adjacent concrete fabrication company, and the fire station. The types of noise that would be experienced include noise from demolition and construction activities, engines, and backup alarms. Noise level reduction with distance could be greater, depending on the effects of terrain and line-of-sight barriers such as buildings.

Potential for Encountering Contaminated Soils during Construction

There is a low to moderate potential for encountering contaminated soils or river sediments during construction of treatment facilities. Contaminated soils and sediments are strictly regulated for both those handling such materials and the general public. Regulations would reduce the potential for exposure and release. (See the discussion under Mitigation Measures Common to All Treatment Facilities.)

Accidental Spills during Construction

No significant adverse impacts are anticipated as a result of construction-related spills and other emergencies. The risks of spills during construction of wastewater treatment facilities are similar to risks posed by other large construction projects. Spills of fuels, oils, lubricants, or other substances can occur during transport or on-site during construction. Construction plans would include spill containment provisions and response kits to prevent off-site transport of spilled materials, but construction workers could still potentially come in contact with a spilled fuel or hydraulic fluid. (See the discussion under Mitigation Measures Common to All Treatment Facilities.)

Operation Impacts Common to All Treatment Facilities

Because of the high quality of treated water being discharged from the treatment facility, the safety and redundancy features incorporated into the design of the proposed facilities and the use of standard safety procedures, impacts to environmental health related to the operation of the treatment facilities are not expected to be significant. The discussion below focuses on the potential for impacts related to discharge of treated water, accidental spills, stormwater runoff, emergency overflows, and noise.

Discharge of Treated Water during Operation of Treatment System

The potential human health risks associated with highly treated water being discharged to surface and groundwater are generally directly or indirectly related to three constituents of concern: (1) bacteria, viruses, and other pathogens; (2) metals and organic chemicals; and (3) nutrients. Technology-based effluent limits for municipal wastewater treatment plants must comply with Section 40 CFR Part 133 and WAC 173-221. These regulations set limits for the water quality parameters identified as concerns. See Chapter 6 for further description.

The Carnation treatment facility would be designed to meet all permit requirements developed for the protection of human health and the environment. These requirements would enable the

facility to comply with water quality standards in effect at the time of permit issuance. As described in Chapter 3, the membrane bioreactor (MBR) selected for the treatment plant is one of the best available technologies for treating municipal wastewater and removing the constituents of concern. It also provides the most flexibility to adjust to the regulations specific to each discharge alternative as well as to changing regulations. The MBR would produce water of high quality regardless of which discharge alternative was chosen.

As described in Chapter 3, the Carnation treatment facility would utilize ultraviolet (UV) light for disinfection to respond to concerns about bacteria and other pathogens. Permit requirements stipulate that the total bacteria organism count should not exceed the most probable number (MPN) of 2.2 per 100 milliliters (ml). This level meets the guidelines published by the National Water Research Institute and American Water Works Association Research Foundation in *Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse* (NWRI-00-03). The UV disinfection process would kill nearly all microorganisms remaining in the water after the MBR process.

Studies have been conducted to measure the effectiveness of various types of treatment processes in removing viruses. The MBR technology consistently achieves removal rates of 99.99 percent and meets and exceeds applicable water quality standards (Beverly et al., 2002). As a comparison, conventional secondary treatment processes with disinfection are 48 to 96 percent effective in removing viruses in influent wastewater.

As described in Chapter 6, low levels of metals and organic chemicals are already present in freshwater systems, including the Snoqualmie River (see also Appendix A). Metals and organic chemicals (such as polynuclear aromatic hydrocarbons or PAHs) may also be present in highly treated water at very low levels. People pursuing recreational activities in the Snoqualmie River may potentially be exposed to these low levels of chemicals. The short duration of contact, the low volume of highly treated water being discharged, and rapid dilution by native river water would further reduce exposure to negligible levels. The highly treated water would meet all applicable permit requirements. These requirements are based on established criteria for toxic substances that may degrade the receiving water both in terms of aquatic life, and for purposes of reducing risks to human health (WAC 173-201A and 173-221).

Currently, state and federal water quality standards and criteria do not consider endocrine disruptor chemicals (EDCs). MBR treatment would remove a large percentage of suspected EDCs. Despite treatment, some potential endocrine disruptors may pass through the treatment system and be discharged (Stahlschmidt-Allner et al., 1997; Ternes et al., 1999). Both national and international research is being conducted on this issue. King County will continue to monitor research results and incorporate findings into its wastewater management approach as appropriate. The MBR technology provides flexibility to address changes in regulations should standards be developed for EDCs. Refer to Chapter 6 for further discussion.

As discussed earlier in this chapter under Existing Wastewater Treatment and Associated Human Health Issues, the nutrient nitrate, when present at high levels in drinking water, can pose a risk to human health. The Washington State Department of Health developed a Maximum Contaminant Level (MCL) for nitrates to protect drinking water supplies. The MCL for nitrate is less than 10 milligrams per liter (mg/l), measured as nitrate-nitrogen (NO_3-N). The Carnation

treatment facility would treat wastewater to below the MCL for nitrate if discharge to uplands is selected.

Accidental Spills during Operation of Treatment Plant

The risk of a chemical spill during operation of the wastewater treatment plant would be minor with the safety measures incorporated into the design of the treatment plant and appropriate handling procedures. The greatest potential risk would be to treatment plant operators because none of the chemicals that would be used at the treatment facility would cause impacts beyond the immediate vicinity of a spill. Emergency spill response procedures would be in place at the facility, and employees would be trained to respond.

Operation of wastewater treatment facilities requires the use of various chemicals for disinfection, odor control, and other processes. Chemicals would be delivered by truck and stored on-site in bulk storage tanks. These chemicals can pose health risks to treatment plant staff as well as the general public if uncontrolled. The Uniform Fire Code (UFC) regulates storage and use of these chemicals to reduce the potential for spills as well as specifying procedures to respond to spills. The two basic types of classified chemicals of concern are: (1) water reactive and oxidizing materials, which are considered physical hazards; and (2) corrosives and irritants, which are considered health hazards. The following materials that are anticipated to be used at the Carnation wastewater treatment plant are water reactive, oxidizers, corrosives, or irritants and, as such, are considered potential environmental health hazards under the UFC:

- **Sodium hypochlorite** is a liquid commonly used as household bleach. It is a strong oxidizing agent and, like bleach, may cause burns to eyes, skin, and the respiratory and digestive tracts. Although nonflammable and noncombustible, sodium hypochlorite is corrosive. Sodium hypochlorite is commonly used in treatment processes for backup odor control and membrane cleaning.

- **Aluminum sulfate** is commonly used for backup phosphorous removal and as a coagulant for clarification of water. It is a strong oxidizing agent, may be harmful if inhaled, and is an irritant to the eyes and skin. The substance is stable under normal conditions and is not flammable.

- **Caustic soda** (sodium hydroxide) is commonly used for backup alkalinity control. Although nonflammable and noncombustible, it can cause severe burns to eyes, skin, and the respiratory and digestive tracts.

- **Citric acid** is commonly used for membrane cleaning. Although it has low flammability and is noncombustible, it may cause irritation to eyes, skin, and the respiratory tract.

All chemical storage and handling would be designed to comply with the applicable local, state, and federal regulations. See the section in this chapter titled Mitigation Measures Common to All Treatment Facilities for a description of measures to prevent accidental spills.

Stormwater Runoff during Operation of Treatment Plant

Stormwater from areas of the treatment plant where there is a risk of chemical or solids leaks or spills, such as loading areas, would be collected and segregated and then routed to the treatment plant. This would cause any leaks or spills in these areas to be contained and treated and not discharged untreated to adjacent surface waters. Stormwater generated at parking lots and other general areas of the treatment plant site where no wastewater, solids, or chemicals are handled would be routed to biofiltration swales for treatment, and then infiltrated into the ground or directed to natural surface waters.

Potential for Emergency Overflows during Treatment System Operation

In the very unlikely event of severe system failures, there is a potential for emergency overflow of partially treated wastewater to occur, which could result in risks to public health. State and federal guidelines require that storage basins (for the wetland and upland discharge alternatives only) and full standby power systems be provided to comply with reliability criteria. System redundancy features such as backup pumps would also be included. These measures would greatly minimize the potential for release of partially treated wastewater from the treatment plant. See the section on basic treatment plant configuration in Chapter 3 for additional discussion of backup systems to prevent/minimize the potential for emergency overflows.

If such a release were to occur, partially treated wastewater would be discharged to the plant's stormwater system, with the potential to eventually drain to local watercourses. Short-term human health impacts could result if partially treated water were to be discharged from the treatment plant site to public areas. The effects of emergency overflows on human health would depend on the proximity to human populations that come in contact with the partially treated wastewater. Contact with bacteria, viruses, or protozoa present in the partially treated wastewater could result in illness.

For the upland and wetland discharge alternatives, the facility would provide 24-hour emergency storage to prevent partially treated water from leaving the facility, as mandated by state regulations. For the river discharge alternative the 24-hour emergency storage is not mandated by regulations; however, with the backup systems designed into the proposed facility, risks would still be minimal.

With the measures that would be required as part of permitting for the project, the risks associated with an emergency overflow would be minimized. The mitigation measures discussed under Mitigation Measures Common to All Treatment Facilities would further reduce these potential impacts.

Noise Impacts during Operation of Treatment Facilities

The following types of noise are typically associated with treatment facility operation:

- Noise from the operation of mechanical equipment, including pumps, blowers, fans, mixers, and generators

- Noise from standby electrical generation equipment (e.g., backup generators for treatment facilities during a power outage)

- Noise from truck traffic, including deliveries and the transport of solids, grit, or screenings

No significant noise impacts from facility operations are anticipated. Equipment that generates substantial levels of noise at the treatment plant could be enclosed or shrouded in sound-attenuation structures. At posted speed limits, impacts from truck traffic noise are expected to be minimal due to the low number of trucks using the facility.

Discussion of operational noise specific to each treatment plant site is provided below.

City-owned Site. The closest noise-sensitive receptors to the City-owned site are residences and visitors to Tolt MacDonald Park. The treatment plant would be considered an industrial noise source. The noise generated by plant operations that would be heard at these closest receptors would not exceed City of Carnation nighttime standards of 50 dBA for an industrial source generating noise in a residential area (see Table 10-1).

Weckwerth Site. The nearest noise sensitive receptor to the Weckwerth site, Tolt Middle School, is located north of the site. Noise generated by the treatment plant (an industrial noise source) as experienced at the school would not exceed levels allowed by the City of Carnation for a residential area during the daytime (60 dBA).

10.2.1.1 Mitigation Measures Common to All Treatment Facilities

Construction Mitigation Measures Common to All Treatment Facilities

Measures to Minimize Construction Noise Common to all Treatment Facilities

The following mitigation measures could be used to minimize noise impacts as a result of construction:

- Conduct construction activities during weekdays between permitted construction hours (City of Carnation – 7 a.m. to 7 p.m., King County – 7 a.m. to 10 p.m.). Any construction activities occurring outside of exempt daytime hours would require a variance, and the public would be notified as needed.

- Use modern construction equipment, including vehicles and machinery, throughout the duration of construction.

- Where practicable, muffle noisy portable equipment such as generators and locate such equipment as far away from sensitive receptors as practical. Operation of the generator used for construction dewatering (if needed) would be required to meet allowable noise levels in the City's noise ordinance.

- Maintain muffler systems on heavy construction equipment in good working order to ensure maximum noise attenuation.
- Use noise barriers or other measures to minimize noise impacts on sensitive receptors.
- Install double-pane windows in buildings potentially affected by construction noise.
- Locate construction haul routes to minimize impacts on sensitive receptors as appropriate.
- At the Weckwerth site, seek a construction access easement farther away from the school than the current site access.
- Establish a 24-hour hotline for the public to express complaints about noise impacts. Send flyers to the community well in advance of construction to inform them about the project.

Measures to Address Contaminated Soils and Accidental Spills during Construction Common to All Treatment Facilities

The following measures could be used to minimize risks associated with encountering contaminated soils and with handling chemicals during construction:

- Comply with hazardous waste regulations (Model Toxics Control Act [MTCA] rules per Chapter 173-340 WAC) and standard procedures to determine the nature and extent of contamination. This could include conducting environmental site assessments and hazardous material surveys prior to right-of-way acquisition or construction of the conveyance pipeline.
- Prepare a hazardous substance management plan to specify procedures, including identification, storage, and disposal, for work in areas where contaminated soil could be encountered. Compliance with MTCA would reduce the potential for exposure to contaminated soils and would require approved disposal.
- Conduct site work in compliance with OSHA/WISHA standards for the protection of worker health.
- Develop a Spill Prevention, Containment, and Control Plan (SPCCP) prior to construction. Observe all applicable safety and environmental regulations for handling chemicals and responding to emergencies as described in the plan. Maintain spill containment and cleanup materials at the construction site.
- Design all chemical storage and handling facilities to comply with the applicable local, state, and federal regulations, such as UFC regulations for tank leakage, spill control, and secondary containment (Section 8003.1.3 UFC); the Resource Conservation and Recovery Act (RCRA); and Occupational Safety and Health Administration (OSHA) requirements.

Operation Mitigation Measures Common to All Treatment Facilities

Measures to Minimize Health Risks from Discharge of Treated Water Common to All Treatment Facilities

The MBR selected for the treatment plant is one of the best available technologies for treating municipal wastewater. Wastewater would be treated to meet or exceed all applicable water quality standards and to comply with Ecology's NPDES requirements. These standards and requirements are designed to protect human health and the environment.

Water quality monitoring and reporting would be conducted in order to verify that discharge of highly treated water meets or exceeds all water quality standards. This monitoring would occur prior to discharge and in the environment receiving the discharge.

Measures to Minimize Accidental Leaks and Spills during Operation Common to All Treatment Facilities

The following measures could be used to minimize the risk of and respond to accidental leaks or spills during operation of the treatment facility:

- Incorporate measures including spill containment provisions, double-walled storage facilities, and emergency cleanup procedures into the design of the facility.

- Design all chemical storage and handling facilities to comply with the applicable local, state, and federal regulations, such as UFC regulations for tank leakage, spill control, and secondary containment; RCRA; and OSHA. The UFC includes requirements for appropriately sized, liquid-tight floor containment (secondary containment) and special sumps and collection systems. Secondary containment would consist of a separate containment area around each of the chemicals stored at the facility with a minimum capacity equal to the maximum volume stored in the tank. Drip sumps that drained to the containment area would be placed below the fill ports for each tank. Any drainage from the containment areas would be routed to the treatment plant for treatment. Other safety features would include leak detection systems, alarms, overfill protection, clear labeling, splash guards, eyewash and shower, and cabinets for goggles and other personal protection equipment.

- Design treatment facilities to include measures that minimize the risk of fire or explosion. Examples include fire sprinklers, an alarm system and maximum use of non-combustible building materials.

- During operation, clean and inspect chemical and process treatment tanks, piping, and equipment on a routine basis to prevent spills and leaks.

- Develop spill prevention and response plans to prepare for and handle leaks or spills of chemicals. At a minimum, plans would meet the requirements of both the UFC, which requires a Hazardous Material Management Plan, and the Clean Water Act regulations

(40 CFR 112), which require a Spill Prevention, Containment, and Control Plan for storage of petroleum products.

- Develop emergency response programs in cooperation with the local fire district and emergency service providers. If a spill or leak occurs, notify appropriate agencies and isolate the spill area.
- Ensure that treatment facility operators are trained in chemical handling protocols and the use of personal safety equipment.
- Comply with all U.S. Department of Transportation safety requirements for transportation of the chemicals used at the treatment facility, including use of double-walled tanker trucks.
- Design force mains to withstand operating and transient pressures in accordance with American Water Works Association design criteria and Ecology's *Criteria for Sewage Works Design* (Ecology, 1998).
- Minimize potential for escape of chemicals or wastewater in the event of flooding by designing chemical storage tanks to be sealed and treatment tanks to be tall enough that they won't be overtopped by 100-year flood.
- Contain potential airborne contaminants by cleaning and covering areas that could release contaminants and meeting air quality standards for site emissions.
- Design the stormwater collection system within the treatment plant facility to separate runoff from process areas (such as loading and biosolids handling areas) from non-process areas (such as rooftops and parking lots). Slope process areas so that they direct stormwater from these areas to the treatment plant for treatment.
- Develop security and emergency response measures and protocols for the treatment plant to protect against unauthorized entry. These measures could include restricted access, fencing, controlled visitor access, and security cameras.

Measures to Minimize Risks of Emergency Overflows Common to All Treatment Facilities

To prevent overflows, the treatment plant would be designed to meet the reliability and redundancy standards required by federal and state regulations for the plant operation as well as the selected discharge alternative. These measures include:

- Installation of full standby power systems in accordance with federal and state reliability criteria. These standards require that in the event a power source has a mechanical failure, its standby or backup unit would automatically be placed in operation. A backup electrical power source (diesel generator) and associated equipment would be provided to reduce the potential for overflows. The generator would be designed to automatically start upon a power failure.

- Installation of backup screens, pumps, sedimentation basins, aerators, air diffusers, and disinfectant contact basins to minimize the potential for equipment failure.

- For the upland and wetland discharge alternatives, the facility must provide 24-hour storage basins to handle emergency and maintenance events in order to prevent any partially treated water from leaving the facility (Carollo, 2003b).

- The Wastewater Treatment Division has a dedicated staff that regularly maintains and tests all of the equipment in its system, including emergency generators. In addition, members of the Division staff are on call 24-hours per day to correct any problems that may occur.

- Response to emergency incidents such as power outages and earthquakes would be in accordance with the King County Emergency Management Plan. The plan identifies roles and responsibilities related to restoring and continuing public works functions, including wastewater treatment, in the event of such emergencies. Procedures specific to the Carnation treatment system would include annual training for treatment plant operators, isolating facilities from public access, signage, monitoring of receiving waters to ensure public health and safety, and other emergency procedures.

In the unlikely event that there was a severe multiple-system failure and an emergency overflow occurred, several measures would be implemented:

- The Seattle-King County Department of Public Health (SKCDPH) would install temporary warning signs or provide other methods of notification in affected areas.

- Appropriate cleanup measures would be initiated and water quality monitoring would be conducted until conditions returned to background levels.

- Ecology would be notified within 24 hours of an emergency overflow.

Measures to Minimize Noise during Operation Common to All Treatment Facilities

The following mitigation measures could be used to minimize noise impacts during the operation of the wastewater treatment facilities:

- Maintain facility vehicles and trucks used to transport solids in good working order.

- Locate noisy equipment inside buildings and use noise-attenuating features such as sound insulation (e.g., sound absorption panels) on equipment and walls; sound-attenuating louvers; isolation of noise-producing equipment in separate rooms; and/or provision of sound-insulating enclosures over noise-producing equipment.

- Design buildings so that large-mass components are positioned to dampen noise.

- Design doors (especially near noisy equipment such as the generator) so that they minimize noise transmission when closed.

- Orient openings such as louvers and doors away from sensitive receptors (e.g., school).
- Locate outdoor equipment such as transformers in such a way that building structures will act as barriers to shield noise associated with equipment.
- Locate treatment plant as far from sensitive receptors as practicable.
- Place vibration mounts on high-vibrating equipment along with over-vibration cut-out controls.
- Schedule emergency generator testing to minimize noise impacts to surrounding properties.
- Maintain sound-attenuating structures and features in good working condition.
- Incorporate structural features and/or landscaping in the design of the facility to minimize noise impacts of day-to-day operations, especially on sensitive receptors.

Chapter 11
Recreation

Only sections or other elements of Chapter 11 revised for the Final EIS are included here. These changed sections combined with the unchanged sections of Chapter 11 in the Draft EIS constitute Chapter 11 of the Final EIS. Please see the introduction to the "Changes Made in the Draft EIS in Response to Comments" section for a full explanation.

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11.2.5 No Action Alternative

Under the No Action Alternative, none of the project's impacts on recreational resources would occur. Continued reliance on individual on-site septic systems could lead to diminished water quality in the area with increased failure of aging septic systems. This could result in decreased use of water-related recreational resources. Continued use of onsite septic systems could also lead to a decrease in use of school sports facilities, if drain field reserves or new drain field construction would require use of those areas (Brandon 2004).

11.5 References

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Chapter 13
Cultural Resources

Only sections or other elements of Chapter 13 revised for the Final EIS are included here. These changed sections combined with the unchanged sections of Chapter 13 in the Draft EIS constitute Chapter 13 of the Final EIS. Please see the introduction to the "Changes Made in the Draft EIS in Response to Comments" section for a full explanation.

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13.1.1 Relevant Regulations

Federal Laws

Federal laws, regulations, agency-specific directives, and Executive Orders require a consideration of cultural resources in federal undertakings. Section 106 of the National Historic Preservation Act (NHPA) of 1966, its subsequent amendments, and Executive Order 11593 require that federal agencies consider the effects of a federal undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places (NRHP). Section 106 requires federal agency coordination with the SHPO and appropriate tribes.

State Laws

The State of Washington protects cultural resources, including Indian graves and archaeological sites. State laws include Chapter 27.44 of the Revised Code of Washington (RCW), Indian Graves and Records, and Chapter 27.53 of the RCW, Archaeological Sites and Resources.

The State Environmental Policy Act (SEPA) (RCW Chapter 197-11) requires that state and local agencies evaluate and mitigate the impacts of their actions on cultural resources. SEPA requires that significant properties, including properties listed in or eligible for the Washington Heritage Register, be given consideration when actions have the potential to affect them.

Local Regulations

King County has passed ordinances that govern management of archaeological sites and historic buildings and structures in unincorporated areas. The City of Carnation has passed similar ordinances to address archeological sites and historic buildings and structures within the city limits.

The King County Historic Preservation Program (HPP) administers incentive programs, conducts environmental review, maintains King County's historic resource inventory and archaeological sensitivity model, and manages the King County Landmark Program. The King County HPP also reviews development proposals located on or adjacent to historic resources listed in the King County Historic Resources Inventory (HRI). The HRI includes districts, objects, cultural landscapes, and other historic sites in addition to archaeological sites, historic buildings, and historic structures.

The City of Carnation Municipal Code (CMC) adopts by reference SEPA provisions as outlined above. Section 14.04.210 of the CMC establishes the City's policy to "preserve important historic, cultural and natural aspects of our national heritage." CMC 15.96 Historic Preservation and Downtown Design specifically addresses historic preservation. Under CMC 15.96 King County Landmarks and Heritage Commission is designated and empowered to act as the Landmarks Commission for the City.

Table 13–1. Inventoried Historic Properties in the Carnation Vicinity

Historic Property or Structure	Address or Location	Listing Status
Andrew and Bergette Hjertoos Farm, 1907 (house), 1910 (barn)	31523 NE 40th Street	Washington Heritage Register, National Register, and Register of King County Landmarks
Adair Farm)	27929 NE 100th St.	Washington Heritage Register and National Register
David and Martha Entwistle's House, 1912	32021 Entwistle Street	Washington Heritage Register, National Register, and Register of City of Carnation Landmarks
Independent Order of Odd Fellows Hall (Eagles Hall) No. 148, 1895	3940 Tolt Avenue	Washington Heritage Register, National Register, and Register of City of Carnation Landmarks
Stossel Bridge (Carnation Farm Road Bridge), 1951	NE Carnation Farm Road / Snoqualmie River crossing	Washington Heritage Register, eligible for National Register, and Register of King County Landmarks
Commercial Hotel, 1913	31933 W. Rutherford Street	Register of City of Carnation Landmarks
Great Northern Boarding House, 1918	31619 Commercial Street	Not listed; local historical significance
William and Eugenia Lord House, 1911	Northeast corner of NE 40th Street and Tolt Avenue	Not listed; local historical significance
James and Sarah Davis House, 1900 (original); remodeled 1946 and 1986)	Southwest corner of King Street and Entwistle Street	Not listed; local historical significance
Tolt River Outfitters (originally Tolt State Bank), 1911	Southwest corner of Tolt Avenue and Entwistle Street	Not listed; local historical significance
St. Anthony Catholic Church, 1914	Southeast corner of E. Blanche Street and E. McKinley Street	Not listed; local historical significance
Snoqualmie Valley Trail-Tolt Trestle	Snoqualmie Valley Trail crossing of Tolt River	Not listed; local historical significance

Sources: Washington Office of Archaeology and Historic Preservation, 2003; King County, 2000; Tolt Historical Society, 1991; LAAS, 2004.

13.3 Cumulative Impacts

If construction activities for the treatment facility were to coincide with other local construction projects such as the City's wastewater collection system, there is a potential for construction activities to cumulatively impact historical resources during the 2006 to 2007 construction period. The City of Carnation will conduct a separate SEPA environmental review process for the local sewer collection system. This review will include cultural and historic resources.

Also, the establishment of wastewater treatment services could result in the City of Carnation's Comprehensive Land Use Plan being more fully implemented, resulting in an increase in new construction activity. Increased development pressure to convert properties to new uses and changes in property values could have an impact on both cultural and historic resources.

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Chapter 14
Transportation

Only sections or other elements of Chapter 14 revised for the Final EIS are included here. These changed sections combined with the unchanged sections of Chapter 14 in the Draft EIS constitute Chapter 14 of the Final EIS. Please see the introduction to the "Changes Made in the Draft EIS in Response to Comments" section for a full explanation.

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14.1.2 Existing Conditions at Treatment Plant Sites

14.1.2.1 City-owned Site: Existing Conditions

The City-owned site has only one access, via Entwistle Street. Entwistle Street west of SR 203 is an unimproved street with narrow pavement that is less than 20 feet in width and has no sidewalk, curb, or gutter. The pavement condition is described as fair in the City's Comprehensive Plan.

Entwistle Street is designated as a commercial access street in the City of Carnation Transportation System Plan. Entwistle Street intersects the property at the northeast corner and extends east for approximately 800 feet to intersect with Tolt Avenue (SR 203). Approximately 500 feet to the south, and beyond adjacent properties, is NE 40th Street—also connected to Tolt Avenue on the east.

There are no north, south, or west access routes immediately adjacent to the site, although two neighborhood access streets (Stewart Avenue and Stephens Avenue) do extend north from Entwistle Street to the east of the site. NE 40th Street dead-ends at the King County Tolt MacDonald Park adjacent to the City-owned site on the west. The City has plans to extend 315th Avenue NE, which runs north-south, along the east side of the site. This road would be extended to the south and connect with NE 40th Street. This would provide a second access route to the City-owned site.

14.1.2.2 Weckwerth Site: Existing Conditions

The Weckwerth site is connected directly to Tolt Avenue via a shared "flagpole" access driveway on the north side of the site. This is the only access route to the site. The access driveway extends approximately 300 feet in length from the property west to Tolt Avenue. There are no north, south, or east access routes immediately adjacent to the site. While Tolt Avenue is an improved street with sidewalks, curbs, and gutters along most of its length through Carnation, there are no street improvements in the stretch where the driveway intersects with Tolt Avenue. The pavement condition is described as fair to good in the City's Comprehensive Plan. Typically 1 to 6 trucks and about 20 to 30 worker vehicles use the driveway to access the site each working day.

The segment of Tolt Avenue that includes the intersection with the Weckwerth Site driveway is in a school zone associated with the Tolt Middle School. By law, school zones are established to restrict traffic speed within these zones. The speed limit in the school zone associated with Tolt Middle School is 20 miles per hour.

14.2.1.3 Mitigation Measures for Treatment Plant Alternatives

The following measures could be implemented to minimize traffic impacts of the project during construction:

- Develop a traffic control plan for construction to ensure continued vehicular, pedestrian, and bicycle access on streets in the project vicinity. Coordinate with local agencies for final plan approval, including any traffic detour plans, construction hours, and acquisition of necessary permits for construction.
- Provide multiple sources of construction activity updates such as informational signage, newspaper notices, and a project website.
- Notify the police, fire, ambulance, and local transit of any street blockages and provide flaggers or other traffic controls to maintain safe public access along adjacent streets.
- Provide parking for construction equipment, trucks, and other vehicles on site to avoid impacts to adjacent streets.
- Implement construction BMPs to control dust and reduce tracking of soil onto adjacent streets and roadways.
- For the City-owned site, improve Entwistle Street with, at a minimum, new paving to mitigate the impacts of the increased volume of car and truck traffic between the construction site and Tolt Avenue (SR 203), as well as for the impacts related to dust and erosion.
- For the City-owned site, developing an extension of 315th Avenue NE from Entwistle Street south to NE 40th would route construction and operation traffic away from the central business area.
- For the Weckwerth site, an improvement of the driveway from Tolt Avenue (SR 203) with new paving could mitigate the impacts of increased car and truck traffic volumes.
- For the Weckwerth site, minimize construction traffic during peak morning and afternoon student transportation periods associated with Tolt Middle School.

Chapter 15
Public Services and Utilities

Only sections or other elements of Chapter 15 revised for the Final EIS are included here. These changed sections combined with the unchanged sections of Chapter 15 in the Draft EIS constitute Chapter 15 of the Final EIS. Please see the introduction to the "Changes Made in the Draft EIS in Response to Comments" section for a full explanation.

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15.1.2.1 Existing Public Services in Project Area

King County Fire District #10, prior to 1999, provided fire protection service to the City of Carnation. In 1999, Fire District #10 entered into a joint operating interlocal agreement with King County Fire District #38 and the Cities of Issaquah, North Bend, and Sammamish to form a new agency called Eastside Fire and Rescue. The Eastside service area includes 165 square miles and features 12 fire stations, including Eastside Fire Station 85. Eastside Fire Station 85 is located at 3600 Tolt Avenue NE and would be responsible for fire protection within the project area. Emergency vehicles at the station include two fire engines, one aid car, and one rescue unit (Eastside Fire and Rescue, 2003). The fire station operates 24 hours a day, seven days per week. The average response time within the Carnation city limits is approximately five to six minutes from the time a 911 emergency call is placed to the time responding units arrive at the emergency scene (Collins, personal communication, 2004).

The City of Carnation will begin contracting with the City of Duvall for police services on October 1, 2004. The contract calls for three full-time equivalent (FTE) officers and 0.5 FTE Chief of Police. The City currently contracts with the King County Sheriff's Office for two FTE police officers and 0.5 FTE Chief of Police. The contract with the City of Duvall will allow for more flexible coverage by officers within Carnation because of the proximity of Duvall for dispatch.

Riverview School District No. 407 serves the City of Carnation as well as the lower Snoqualmie Valley area. Cedarcrest High School in Duvall serves Carnation students in grades 9 through 12. Tolt Middle School and Carnation Elementary are located in the project vicinity. Tolt Middle School (grades 6 through 8) is located at 3740 Tolt Avenue, directly north of the Weckwerth site and within 1 mile of the City-owned site. Student enrollment for the 2002/2003 school year was 661 students. Carnation Elementary School is located within the project vicinity at 32240 NE 50th Street. Student enrollment for the 2002/2003 school year was 366 students (Greatschools.net, 2003). The segment of Tolt Avenue that includes the intersection with the Weckwerth site driveway is in a school zone associated with the Tolt Middle School. By law, school zones are established to restrict traffic speed within these zones. The speed limit in the school zone associated with Tolt Middle School is 20 miles per hour.

The City of Carnation has adopted the *King County Solid Waste Management Plan* and is subject to its policies relating to solid waste services. Carnation has signed a Solid Waste Interlocal Agreement with King County to utilize the County-operated Cedar Hills Landfill for solid waste disposal. Waste Management, Inc., is responsible for the collection and disposal of solid waste and also has a contract to provide recycling services to the City (Carnation, 1997).

15.2.1.1 Impacts to Public Services for Treatment Plant Alternatives

Public Services Construction Impacts for Treatment Plant Alternatives

During construction, no significant impacts to law enforcement, fire, and emergency service response times are expected from roadway disruptions. Emergency service response times could be affected by increased traffic along nearby roadways during construction. Eastside Fire Station 85 is located immediately west of the Weckwerth site along Tolt Avenue. However, traffic control measures including implementation of a city-approved traffic control plan and notification to emergency service providers of street blockages could be used to minimize impacts to emergency service vehicles.

No significant impacts to public schools are expected during construction with the implementation of appropriate mitigation measures as identified in this EIS.

A minimal volume of debris is expected from site clearing activities. No impacts to regional solid waste handling services and facilities are anticipated.

Public Services Operation Impacts for Treatment Plant Alternatives

No significant impacts to public services are expected from the long-term operation of the treatment plant. Development of the treatment plant may result in the need for emergency response to the site and routine inspections by the fire department; however, it is not expected to result in a significant increase in demand for service. Removal of the house at the City-owned site would displace social services provided by the Snoqualmie Tribe.

15.2.1.3 Mitigation Measures for Treatment Plant Alternatives

Public Services Mitigation Measures for Treatment Plant Alternatives

The following measures could be used to minimize impacts to public services during construction and operation of the treatment plant:

- Provide public notification of proposed construction activities, including timing of construction, to all local service providers and schools within the immediate vicinity of the treatment plant site.
- Plan construction traffic routing to maintain free-flowing traffic conditions and minimize potential increases to response times for emergency vehicles. Develop construction traffic plans in accordance with local permitting requirements to ensure emergency service providers identify emergency access routes that are to be maintained during construction activities. For the Weckwerth site, minimize construction traffic during peak morning and afternoon student transportation periods associated with Tolt Middle School.
- Prior to construction, prepare an Emergency Response Plan addressing construction and operation safety issues and response procedures to emergencies.
- Coordinate with local fire and emergency service providers to ensure they have the necessary training and equipment to assist in an emergency related to the treatment plant system.
- Ensure that contractors provide safety personnel at construction sites in accordance with the Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) requirements. In case of an emergency at a construction site, the contractor would be the first to respond, with local fire and emergency service agencies providing backup support if required.
- Prepare a Hazardous Materials Spill Prevention Plan in accordance with federal, state, and local regulations. The plan would outline specific procedures that construction and emergency service providers would follow in the event of an accidental spill of chemicals. These procedures would include appropriate coordination with local schools, businesses and residents.

Utilities Mitigation Measures for Treatment Plant Alternatives

During the design phase of the selected Carnation treatment facility, King County would coordinate with local utility service providers to assist in utility locations and to identify specific mitigation measures to minimize impacts to utility purveyors.

15.2.4 No Action Alternative

The No Action Alternative is not expected to have a significant impact on existing public services. The current service providers appear to have adequate capacity to meet near-term demands. Some current public service providers could find it difficult to add on to their facilities because of current Seattle-King County Department of Public Health regulations for expansion or new construction of on-site septic systems. In a recent letter, the City of Carnation stated, "Public services currently find it difficult, if not impossible to add on to their facilities. This would continue, as would the difficulties and impossibilities for new services to locate in Carnation and existing services remain" (Brandon 2004).

The City of Carnation would continue to rely on on-site wastewater disposal in the absence of a wastewater utility. The impacts of reliance on on-site wastewater disposal include potential threats to water quality and limits on development. Please see Chapters 6, 9, and 10 for further information on these impacts.

15.3 Cumulative Impacts

No cumulative impacts are anticipated. The existing major services and utilities appear to have adequate capacity to meet current and future demands with the implementation of the proposed treatment facility.

15.5 References

Brandon, B. 2004. City Manager, City of Carnation. Letter to Don Theiler, Division Director, King County Department of Natural Resources and Parks, Wastewater Treatment Division regarding Carnation Wastewater Treatment Facility Draft Environmental Impact Statement. August 9, 2004.

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Technical Memorandum 2
Population, Flow and Loads

Draft
September 2004

Only sections or other elements of Technical Memorandum (TM) 2 revised for the Final EIS are included here. These changed sections combined with the unchanged sections of Technical Memorandum 2 in the Draft EIS constitute Technical Memorandum 2 of the Final EIS. Please see the introduction to the "Changes Made in the Draft EIS in Response to Comments" section for a full explanation.

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4.3 Water Conservation

It is King County's desire to reduce wastewater production rates in all of its service districts. Furthermore, RCW 90.48.495 requires that sewer plans include analysis of the potential effects of water conservation programs on wastewater flow.

Although the Carnation WWTF will be a new facility, existing housing and commercial establishments in Carnation will include a variety of older, conventional fixtures. It is possible that, through replacement of conventional fixtures by water-conserving fixtures, a significant further reduction in unit wastewater could result. This would not be expected to affect wastewater loads, except that concentrations would be increased.

The City of San Francisco conducted a study on the savings resulting from 1,024 multi-family conservation audits in 1994. This study found that for smaller accounts (25 hundred cubic feet (ccf) per month) consumption was reduced 6-24 percent. For larger accounts, however, (500 ccf or more per month) water consumption actually increased by 4-13 percent[1]. New York City's Toilet Rebate Program replaced over 1.1 million old high-water-consuming toilets (5 gallons per flush) with 1.6 gallon per flush units[2]. This survey reviewed customer satisfaction with the program, but did not estimate the overall savings in wastewater production. The City of Barrie, Ontario pursued a program of replacement of fixtures with ultra low flow 6-liter toilets and low flow showerheads and faucet aerators[3]. They concluded that replacement of two thirds of the City's inefficient toilets could defer the need for water treatment plant expansion by 3 to 5 years.

Another study conducted in Australia found a 30 percent savings in water consumption because of energy and water efficient design of a medium density town house development[4]. The City of Albuquerque, New Mexico, has set a goal of reduction in water consumption by 30 percent through use of water saving fixtures and low water consumption landscaping[5]. Landscaping savings would not result in a reduction in wastewater production, however.

For Carnation, an analysis of water conservation was conducted by King County staff. A series of potential water conservation goals were established as follows:

- Conventional Design
- Code Reduction after 2000
- Bring Existing Residents to Code

[1] Knox, Kimberley M., "Savings from San Francisco Water Department's Multifamily Conservation Audit Program", AWWA, 1996.
[2] New York City Department of Environmental Protection, Bureau of Customer and Conservation Services, "Evaluation of New York City's Toilet Rebate Program: Customer Satisfaction Survey: Final Report", 1996.
[3] Gates, Chris, Ramsay, Judith, and Brown, Ken, "An Evaluation of the Effectiveness of a Municipal Toilet Replacement Program," in 1996 *Annual Conference Proceedings*, *the American Water Works Association, Water Resources*, June 23-27, 1996.
[4] Cumming, H., "Water Consumption Down 30% at Stringybank Grove", AWWA, January/February 1996.
[5] AWWA, "How to Save Water at Home: A Step-By-Step Manual for the Do-It-Yourselfer, 1996.

- Residential Conservation Retrofit
- Full Conservation Retrofit

Conventional design represents the unit rates presented in Table 2.3. The second category assumes that future residential connections will use low-water-consuming toilets and contribute a percapita rate of 54 gpcd, rather than the 70-gpcd rate from Table 2.3. This is not really a conservation measure, but rather an assumption that existing code requirements will be enforced in the future with the effect that new homes would contribute 54 gpcd, rather than 70 gpcd. The third scenario assumes that in addition to new homes contributing at 54 gpcd, existing homes in Carnation would be retrofitted with low-water-consuming fixtures to reduce the overall unit rate to 54 gpcd. The fourth scenario assumes that in addition to low-water-consuming toilets, low-water-consuming washing machines and dishwashers would be installed in all residential units as part of a comprehensive program of water conservation. In the last scenario, it is assumed that full retrofit for low-water-consuming fixtures would also be pursued in commercial establishments and schools. Table 2.7 presents the assumed unit rates for wastewater flow production for each of the five water conservation scenarios. Estimated flow rates are presented in Table 2.8. The table shows the estimated flow savings from each of the four conservation scenarios.

To explore impacts of conservation, estimated costs for implementation of conservation programs corresponding to the four conservation scenarios were compared to the capital and operating cost savings that would be realized in construction and operation of new collection and treatment facilities for Carnation, if the assumptions stated above for each scenario come true. Cost estimates for implementation of the conservation strategies were provided by King County. Cost estimates for treatment plant construction and operation were based on Carollo cost models for a membrane bioreactor plant assuming the same level of associated facilities as assumed in the HDR report.[6] Estimated costs for the conservation programs are presented in Table 2.9. The conservation flows and costs presented are rough estimates and require refining. As the sewer project moves forward these figures will be revised and water conservation approaches reconsidered. For further detail on City of Carnation water conservation policy, please see the 2004 City of Carnation *Comprehensive Sewer Plan*.

6. HDR, Inc., King County Conveyance System Improvement Project, King County Wastewater Service to the City of Carnation, Memorandum, 2001

Table 2.7 Unit Water Consumption Rates for Water Conservation Scenarios
Carnation Wastewater Treatment Facility
King County Department of Natural Resources and Parks

Parameter	Conventional Design	Code Reduction after 2000	Bring Existing Residents to Code	Residential Retrofit	Full Retrofit
Unit Flow Rates					
Residential, gpcd	70	70 / 54	54	41	41
Commercial, gpcd	30	30	30	30	26
Middle/High Schools, gpcd	16	16	16	16	8
Elementary Schools, gpcd	10	10	10	10	5
Park, gal per site per day	100	100	100	100	100

Table 2.8 Projected Average Annual Flow Rates for Water Conservation Scenarios
Carnation Wastewater Treatment Facility
King County Department of Natural Resources and Parks

Parameter	Conventional Design	Code Reduction after 2000	Bring Existing Residents to Code	Residential Retrofit	Full Retrofit
Total Average Annual Flow, mgd					
Startup in 2008	0.18	0.17	0.15	0.12	0.11
Full Sewer in 2013	0.27	0.25	0.23	0.19	0.17
Design Flow at 2027	0.35	0.32	0.29	0.24	0.22
Saturation in 2050	0.39	0.35	0.33	0.28	0.25
Conservation Flow Savings (2027)	0.00	0.03	0.06	0.11	0.14

Table 2.9 Projected Average Annual Flow Rates for Water Conservation Scenarios
Carnation Wastewater Treatment Facility
King County Department of Natural Resources and Parks

Costs	Conventional Design	Code Reduction after 2000	Bring Existing Residents to Code	Residential Retrofit	Full Retrofit
Construction Cost, $					
Treatment Plant	$6,100,000	$5,870,000	$5,700,000	$5,360,000	$5,150,000
Conservation Program	$0	$0	$540,000	$2,257,000	$2,660,000
Capital Costs, $					
Treatment Plant	$10,700,000	$10,300,000	$10,000,000	$9,400,000	$9,100,000
Conservation Program	$0	$0	$703,000	$2,934,000	$3,459,000
Operations Cost Present Worth, $	$7,119,000	$6,740,000	$6,464,000	$5,921,000	$5,590,000
Total Present Worth Cost, $	$17,819,000	$17,040,000	$17,167,000	$18,255,000	$18,149,000
Cost Savings, $					
Collection System Capital Cost	$0	$0	$0	$359,000	$359,000
Treatment Plant Capital Cost	$0	$400,000	$700,000	$1,300,000	$1,600,000
Treatment Plant Operations and Maintenance	$0	$379,000	$655,000	$1,198,000	$1,529,000
Total	$0	$779,000	$1,355,000	$2,857,000	$3,488,000
Conservation Savings, $	$0	$779,000	$652,000	($77,000)	$29,000

Cost Basis:

January 2000 Cost Index, Flow estimates based on 2003 Carnation Comprehensive Sewer Plan

River Outfall Allowance of $92,000, no anaerobic tanks for P removal or odor control

Limited administration building (1500 sf), chemical tanks outdoors (heat taped)

Estimated construction costs for treatment based on Carollo Carnation WWTF MBR cost model, O&M Costs based on Carollo model

Assumptions about costs and facilities comparable to HDR Memorandum, September 2001

Collection system cost savings based on Table 4.8 Carnation *Comprehensive Sewer Plan* by Roth Hill

Capital cost markup for treatment plant of 176% times estimated construction cost based on HDR Memorandum

Conservation capital and construction costs based on Table 4.8 Carnation *Comprehensive Sewer Plan* by Roth Hill

Technical Memorandum 5A
Upland Disposal Alternatives

Draft
September 2004

Only sections or other elements of Technical Memorandum 5A revised for the Final EIS are included here. These changed sections combined with the unchanged sections of Technical Memorandum 5A in the Draft EIS constitute Technical Memorandum 5A of the Final EIS. Please see the introduction to the "Changes Made in the Draft EIS in Response to Comments" section for a full explanation.

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1.0 Introduction

One of the disposal options being evaluated for the proposed Carnation Wastewater Treatment Facility is to apply highly treated water (treated wastewater effluent) to an upland area to provide a beneficial use of groundwater recharge. The feasibility of this disposal alternative was addressed in Technical Memorandum 5 (TM5) prepared by the author in 2003. TM5, using existing data, identified an area south of the City of Carnation (City) for which this alternative appeared feasible from a hydrogeologic prospective. A screening procedure was used by Carollo Engineers to specifically identify five parcels for further investigation as potential upland disposal sites. The five parcels have been identified as Sites 20, 21, 125, 126 and 158.

This memorandum presents additional hydrogeologic investigations targeting these five parcels. Specifically addressed are the hydrogeologic setting of the properties and potential impacts that may occur if the properties were to be used for upland disposal.

2.4 Other Analysis

In addition to the above tests and analyses, several methods were used to estimate the population density and well locations near the parcels in question. Aerial photographs taken of the area in August 2001 were obtained from the Washington State Department of Transportation. These were used to locate structures believed to be houses within approximately 2,000 feet of the proposed application sites. Well log records from the Washington Department of Ecology were also obtained for the area. These logs were correlated with GIS information and the aerial photographs to estimate well locations. Analyses of the logs also provide additional subsurface information.

In total, 18 well logs were downloaded from the Ecology database. Nine of these wells were determined to be within approximately 2,000 feet of the proposed application sites. None of the wells are located in the proposed application areas; however, four are sufficiently close that they can be used to further characterize the soils and geology in the proposed application sites. Based upon the owner names given on the well logs, these four wells are identified as the DeBoer well, located less than 1,000 feet northwest of Site 21; the Camp Don Bosco well, believed to be located less than 1,000 feet southwest of Site 21; the Connell well, and the Portwood well, both believed to be located less than 1,000 east of Site 126 and 1,000 feet north of Site 158. All four of logs for these wells indicate sediments that are similar to those found by the borehole drilling at the City's landfill site.

3.2 Soils and Surface Geology

The King County soil survey indicates that the soils covering the six areas being considered for infiltration are entirely covered with Everett Soils (as discussed above). The City's landfill property and three of the four well log sites discussed above also have this soil type. Field work on the City's property confirmed the soil type; presumably the soil type is also correct for the six areas being considered. The soil type has not been confirmed at the well log sites.

The King County soil survey does not indicate a break in soil type between the landfill property and the upland discharge study area. This suggests that the soils are consistent throughout the study area and likely are the same as those found at the landfill site.

The infiltration rate for Everett soils is listed in the soil survey as 2 – 6.3 inches/hr for the top 17 inches, 63 -20 inches/hr for depths of 17 to 32 inches, and greater than 20 inches/hr below 32 inches. While no infiltration measurements were made on Everett soils in the field, observations of the nature of the soil on the City's property tend to support these high infiltration rates.

Turney and others (1995) and Liesch and others (1963) both indicate the surficial geology over the six areas to be Vashon recessional outwash, an uncompacted mixture of sand and gravel. Field observations at the City's property confirmed the presence of Vashon recessional outwash at the surface. On the City's property, the Vashon recessional outwash could be classified as a poorly graded gravel with sand or a sandy gravel. Though the infiltration rate of this material was not measured, it is known to be very high.

3.4 Hydrogeology

The field work performed for this study, along with previous work completed at the landfill, has allowed for a good understanding of the hydrogeology of the adjacent City's property. Well log records for other surrounding properties were used to further assess the hydrogeology of the area.

Borings on the City property show that the recessional outwash gravels at the surface are generally five to fifteen feet thick over most of the southeastern portion of the property. (The gravel outwash is absent on the northern portion of the property, presumably removed by prior mining to the site before becoming a landfill.) Beneath the outwash gravel is a discontinuous fine-grained unit. This unit, on a very local scale, perches water above it in the recessional gravel; but over the scale of the entire property, it is discontinuous enough to allow the recessional gravel to be generally dry. Well log records at the four wells discussed above indicate dry gravelly sediments, with clay, at or near (less than 5 feet) the surface, suggesting similar conditions throughout the area.

As expressed in the boreholes at the City property, beneath the fine-grained unit, or the recessional gravel where the fine-grained unit is missing, is a sequence of silty sands that form the uppermost, widespread saturated zone over the property. This silty sand may represent a fine form of the Vashon advance outwash. All the "B" monitor wells on the City's property are completed in this unit. Similarly, the four well logs all show sequences of "clay"[1] and sand beneath the upper gravelly unit. Three of the four logs indicate water within the "clay" and sand sequence, indicating that it is, like at the landfill property, also saturated. This silty sand unit forms a water table aquifer which probably also exists beneath some or all of the six areas being considered for infiltration. Based on the boreholes at the City's property, the water table aquifer is generally found at elevations of 95 to 115 feet MSL.

Beneath the water table aquifer is a clay-rich layer which varies in thickness across the City property from approximately five feet to more than 20 feet. It appears to thicken to the south. This unit forms a confining layer for the water-bearing sediments below it. On the well logs, this confining unit is represented in two of the four well logs by a clay unit beneath the water table aquifer. The third log (Camp Don Bosco) indicates a till unit, which is also clay-rich, while the fourth (Portwood) lists a non-water-bearing clay, sand and gravel unit.

The lower aquifer at the landfill property is, like the water table aquifer, within a silty sand unit. This confined aquifer beneath the City's property was found at an elevation of 70 to 90 feet and ranges in thickness from ten to 20 feet. Three of the four well logs (Camp Don Bosco, Connell, and Portwood) appear to be completed in this lower aquifer, though it appears to be thicker than 20 feet in all three cases.

The DeBoer well appears to be completed in yet a deeper aquifer. Evidence from other well logs in the area also show deeper confining layers and aquifers present. However, for the purposes of this study, deeper units are not critical to the hydrogeologic discussion.

[1] Though the well logs specifically indicate clay, well drillers often mistake silt for clay, and therefore, it is very possible that the wells encountered a sequence of silty sand rather than clay and sand.

The water table aquifer appears to have a fairly low permeability as a result of its silty nature. Slug testing on Wells 6B and 7B, together with laboratory testing, indicate its hydraulic conductivity is between 0.1 and 1 ft/day. Across the City's property the gradient is 0.04 directed to the northwest, with water level elevations near 117 feet MSL in Wells 6B and 7B and elevations near 104 feet MSL in Wells 3B and 5B (near the northwestern portion of the property). For this project, water levels were monitored in MW5B from September 27, 2003 until the end of February 2004. Over that period the water level in the water table aquifer rose approximately four feet in response to precipitation. While the exact amount of precipitation that fell on the landfill site is not documented, National Weather Service records indicate that approximately 33.5 inches of precipitation fell at Snoqualmie Falls[2] during the period.

The discharge locations for the water table aquifer have not been positively identified. Undoubtedly, much of the water within the aquifer infiltrates downward to the confined aquifer. The fact downward leakage occurs is demonstrated by the head relationships of the two aquifers (that is the water level in the water table aquifer is higher than in the confined aquifer). Besides downward leakage, the aquifer probably discharges to local streams and wetlands. The Langlois Creek wetlands (east of Site 126) and the wetlands at the southwest corner of Site 21 both exist at elevations that are within the elevation range of the water table aquifer (at least its range at the City's property). Therefore, while the flow direction within the aquifer is northwesterly through the City's property, it is probably westerly to southwesterly through Sites 20 and 21, northerly through Site 125, northerly or easterly through Site 126 and easterly through Site 158A. Not enough data is available to estimate the flow direction through Site 158B.

The deeper, confined aquifer appears to be more permeable than the water table aquifer. Data from pumping tests conducted at MW6A and7A indicated transmissivity values of approximately 500 and 1,100 ft^2/d respectively. These values indicate the hydraulic conductivity of the aquifer ranges from approximately 40 to 130 ft/d. Across the City property, the gradient in the confined aquifer is approximately 0.05, directed toward the northwest. Water levels are highest in the south, at approximately 115 feet and lowest in the northwest at approximately 90 feet MSL. Water-level monitoring in MW5A revealed approximately a three-foot increase in water level from September to February in response to precipitation.

Data is not available to identify the discharge locations for the confined aquifer. It likely leaks to deeper aquifers and is discharged to wells for use as a water supply. The aquifer is sufficiently deep that it probably does not discharge directly to local wetlands and streams. It probably discharges upward through a leakage relationship to floodplain sediments near the Snoqualmie and Tolt Rivers. Flow directions across the six properties that are the subject of this report are probably westerly or northwesterly, but specific information to support this assertion is lacking.

To determine the existing quality of ground water at the City's property, a water sample was collected during the testing of MW7A. This well is up gradient from the landfill, so its water quality should be unaffected by any leachate from the landfill. The sample was analyzed for inorganic constituents by a Washington State certified laboratory. Results indicate the water is

[2] Official precipitation records for the month of November 2003 are not available for the Snoqualmie Falls station. Therefore, the total given here substitutes precipitation at the Landsburg Dam station for November.

of excellent quality with all tested parameters below their regulated maximum contaminate levels (MCLs).[3] Selected results are shown below:

Table 1: Selected Water Quality Results

Parameters	Concentration	MCL	Units
Nitrate	1.0	10	mg/l
Iron	0.19	0.3	mg/l
Manganese	0.01	0.05	mg/l
Chloride	2	250	mg/l
Conductivity	141	700	umhos/cm
Total Dissolved Solids	117	500	mg/l

A sample was not collected from the water table aquifer; however, its quality should be similar to that of the confined aquifer.

[3] The results did indicate high turbidity (8 NTU) and color (15 color units). These high values are a result of MW7A being recently drilled and undeveloped. In a properly developed water supply well, it is highly likely the values for these parameters would be much lower.

5.0 Potential Impacts of the Upland Disposal Alternative

Using data generated by this study, the feasibility and potential impacts of using the upland disposal alternative can be discussed. As stated earlier the hydrogeology of the upland discharge study area has been established through field investigations and other analysis of adjacent properties, therefore, a level of uncertainty exists. Given this level of uncertainty the discussion of impacts that follows is a conservative worst case scenario. One potential significant impact is groundwater mounding beneath a potential infiltration basin. The height of mounding determines whether the alternative is feasible.

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Technical Memorandum 5B

Hydrologic Aspects of the Wetland Disposal Alternative

Draft
September 2004

Only sections or other elements of Technical Memorandum 5B revised for the Final EIS are included here. These changed sections combined with the unchanged sections of Technical Memorandum 5B in the Draft EIS constitute Technical Memorandum 5B of the Final EIS. Please see the introduction to the "Changes Made in the Draft EIS in Response to Comments" section for a full explanation.

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1.0 Introduction

One of the disposal options being evaluated for the proposed Carnation Wastewater Treatment Facility is to discharge highly treated wastewater effluent to wetlands in the Washington Department of Fish and Wildlife (WDFW) Stillwater Wildlife area north of Carnation. One goal of this discharge option is to provide the beneficial reuse of highly treated wastewater in wetland enhancement. This possible beneficial use of the discharge water has been supported by WDFW who owns and operates the wildlife area. Additionally, Ducks Unlimited, an organization that promotes wetland conservation, has also expressed interest in partnering with King County in a wetland enhancement project.

The general plan would be to deliver the water to three designated wetlands on the property where it could support and possibly enhance the hydrology of those features, particularly during the dry months of summer and early fall. Application of up to 440,000 gallons per day (gpd) is anticipated to be available to the wetland features. The intent of this study is to characterize the hydrologic and hydrogeologic setting of the Stillwater area and use this characterization to assess the potential affects of the application of treated waste water on the wetlands and the area in general.

The Stillwater Wildlife Area is situated completely within the floodplain of the Snoqualmie River, approximately three miles north of the City of Carnation (City). The property is dominated by several abandoned channel remnants, known as oxbows, separated by terraced upland areas that, until recently, were being farmed. Effluent delivery is proposed to be through a pipeline that carries water from the treatment plant near Carnation, north to the Stillwater Wildlife Area along King County's Snoqualmie Valley Bike/Hike Trail. Discharge has been proposed at three separate locations within the Stillwater area. Detailed information regarding the locations and specific-site characteristics of each location are discussed in subsequent sections of this report.

3.3 Potential Impacts of the Wetlands Disposal Alternative

The wetland disposal alternative at the Stillwater site includes both a basic and expanded option. The basic option includes the creation of new wetlands on the property and the hydrologic enhancement of an existing wetland. The expanded option includes installation of large woody debris clusters or structures at several locations on the unnamed and Harris Creeks. Both options are discussed in detail in Chapter 3 of the Carnation Wastewater Treatment Plant EIS.

Each of the two new wetlands would range in size between six and eight acres with as much as two acres of open water planned in each. The wetlands would be built within existing depressions that now exist north of the unnamed stream in the center of the site. Excavation, if accomplished at all, will be minimal and, therefore, presumably will not penetrate the silt and clay of the uppermost geologic unit. This unit becomes a critical component in the hydrologic response to the wetland enhancement plan. The very low hydraulic conductivity of the unit in conjunction with the inherently low gradients associated with floodplain environments make the anticipated groundwater interaction with the wetland very minor. The Groundwater flow rate through these silt- and clay-rich materials is estimated to be at least several orders of magnitude lower than the 440,000 gpd proposed delivery rate for the reclaimed water. It is also significantly lower than the evapotranspiration that is predicted for the wetlands proposed to receive the reclaimed water.

Since the primary benefits of the wetland-discharge alternative will be realized during the dry season, the precipitation on the property and hydraulics related to the streams is not a principal factor in determining hydrologic advantages. It is clear that the delivery of 440,000 gpd to the wetlands (approximately 220,000 gpd for each of the two wetlands on average) will be the primary source of water during the dry season between May and October. The evapotranspirative losses over a six-acre wetland are expected to be approximately 30,000 gpd through the same period. In contrast, the flow of groundwater through the silt and clay unit against a hydraulic gradient of 2 feet per 1000 lateral feet (.002) are expected to be no greater than one gallon per day across the entire width of the wetland area. Clearly the hydrology of the wetland during the dry season will be dominated by the inflow from the treatment plant discharge and losses through evapotranspiration and the surface discharge over the spillway for a given wetland rather than any gain or loss from or to ground water. Without flow out of the wetlands, the 440,000 gpd input of reclaimed water could support as much as 90 acres of wetland before the inflow is completely balanced by evapotranspiration. However, since the the wetland discharge option calls for discharge into only a limited amount of new and existing wetlands, as much as 190,000 gpd of water could be discharged from each of the wetlands into the riparian habitat associated with the streams that cross the Stillwater site.

Most of this potential 380,000 gpd flow out of the two new wetlands would discharge to the unnamed creek. Under the expanded option, modifications to the unnamed creek and its associated wetlands would be made, not to expand their acreage, but to allow them to be inundated for longer periods. This creek and its associated wetlands cover approximately 43 acres. Assuming similar evapotransporation rates as before, approximately 215,000 gpd may be transpired and evaporated through the unnamed creek and its associated wetlands. This leaves approximately 165,000 gpd ultimately discharging from the unnamed creek to the Snoqualmie River.

The effects on the water quantity and flood flows of the surface waters in the vicinity of Stillwater Water Wildlife Area were also considered. The floodplain is known to be inundated regularly. The prudence of discharging water into a flooded property is bound to be questioned by the community. However, when we consider the flow rates of the delivered water in the context of the average and peak flows associated with the Snoqualmie River, or even the peak flows of Harris Creek, it quickly becomes clear that the 440,000 gpd proposed delivery from the treatment plant is not significant. The 440,000 gpd is equivalent to 0.68 cfs. Very little of it will be lost to evapotransporation during the wet season. This 0.68 cfs must be compared to the 50 cfs average flow or the 400 cfs peak flows of Harris Creek. Not surprising, these numbers pale in comparison to the 3,700 cfs average flow and 15,500 cfs peak flows of the Snoqualmie River measured in the river near Carnation. Placed in this context it is clear that the water being delivered from the treatment plant during the wet season is insignificant to the natural flows. As such, the discharge of the water will not increase the effects of flooding or the erosional aspects of the channels that carry it. No detrimental effects are expected from these discharges during the wet season due to the de minimis nature of the flows being added.

There is another impact that needs to be considered that may result from flooding. As a flood event occurs on the Snoqualmie River, the new wetlands and the ponded areas created by structures placed within creeks (both in the unnamed creek and in Harris Creek in the expanded option) will be more susceptible to being filled with sediments being carried by the floodwater. The natural tendency is for depressions within a floodplain to be filled by flood event deposition. This is countered in the creeks by the erosional processes associated with high flow events in these streams. However, the relatively low flows and the inherently low gradient of these streams as they cross the Stillwater area make these processes fairly ineffective in countering the larger depositional processes of the flooding Snoqualmie itself. Additionally, the sediment load of the smaller streams will also be trapped by the structures, adding to the filling of the created ponds. Further, the wetlands will be created to have essentially no erosive conditions. Though the trapping of sediments is an issue and eventually (without intervention) the wetlands and ponded areas within the streams will be filled in, this sedimentation is likely to be a relatively slow process. The anticipated delivery of sediments will take a very long time to fill the oxbows and channels involved. The detrimental effects of sedimentation must be weighed against the added habitat benefits of the structures likely can be countered by occasional maintenance.

Water quality is another aspect of the wetland hydrology that needs to be considered when discussing the hydrologic effects of this proposed discharge option. The fact that the reclaimed water will be treated to Class A standards eliminates many of the issues typically associated with treatment plant discharge. The water quality of the treated effluent will be essentially the same or better than the surface water and ground water that currently feed the Stillwater area. The method of delivery with water upwelling through gravel will emulate spring activity typical of the region. The physical properties of the water will be controlled at the treatment plant, and any potential thermal loading (elevated temperature) will be nullified by the predicted exchange of heat with the surrounding ground as the effluent flows through the three miles of buried pipe between the plant and the Stillwater site. The residence time in the pipeline will be approximately 2½ hours. Assuming a temperature differential of 20 degrees Fahrenheit between the temperature of the water leaving the plant and the eventual ambient temperature surrounding the transmission line (assuming steel pipe is used), heat exchange on route to the Stillwater site could potentially lower the temperature of the water as much as 10 degrees.